

NASA Technical Memorandum 84626

(NASA-TM-84626) THE 1982 DIRECT STRIKE
LIGHTNING DATA (NASA) 491 p HC A21/MF A01
CSCL 04B

N86-24091

Unclas
G3/47 06039

1982 DIRECT STRIKE LIGHTNING DATA

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MARCH 1983



Review for general release March 31, 1986

NASA

National Aeronautics and
Space Administration

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1982 DIRECT STRIKE LIGHTNING DATA

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SUMMARY

This report presents the wideband waveforms recorded during the 1982 direct-strike lightning tests of the NASA Langley Research Center lightning-instrumented F-106B aircraft. The tests were conducted within about 150 nautical miles of the NASA Langley Research Center, Hampton, Virginia, where the aircraft was based. The entire transient recorder data obtained for 156 strikes in the 1982 campaign are presented in this report.

SYMBOLS

\dot{B}	rate of change of magnetic flux density, tesla per second
\dot{D}	rate of change of electric flux density, ampere per square meter
\dot{I}	rate of change of current, ampere per second
I	current, ampere
A/m^2	ampere per square meter
m	meter
MHz	megahertz
T/s	tesla per second
A	ampere
A/s	ampere per second

INTRODUCTION

This report presents the wideband direct-strike lightning data obtained from the digital transient recorders during 1982 lightning flight tests of the NASA Langley Research Center lightning-instrumented F-106B aircraft. There were 156 strikes to the aircraft during this campaign; there were 10 strikes in each of the 1980 and 1981 tests which were reported in references 1 and 2. The instrumentation system, transient recorders, sensors, and a summary overview of the previous tests are presented in references 3, 4, 5, and 6, respectively.

1982 Lightning Data

The 1982 tests resulted in 156 direct strikes to the aircraft from storm penetration flights at flight levels generally above 20,000 feet. Table 1 summarizes, by flight number, the 1982 data records. The entries under \dot{D} , \dot{B} , I , and \dot{I} are the run numbers which identify each 1310 microsecond record acquired during strikes and nearby strikes from the \dot{D} , \dot{B} , I , and \dot{I} sensors at 10-nanosecond sample intervals. Time histories of each record and expanded time segments of the dynamic portions of the records are included in this report. Sensor locations on the aircraft are shown in figure 1. I and \dot{I} sensors at location 1 measure the current and rate-of-change of current in the pitot boom. The \dot{D} sensor (labeled \dot{D}_F on the waveform plots) is at location 2 and the \dot{B} sensor (labeled \dot{B}_L on the waveform plots) is at location 6. The sign conventions established for the measurements shown in figure 1 indicate positive quantities in the direction of the arrows; the relation between the sign conventions of the variables D , B , and I and their derivatives are shown in the measurement polarity time history also in figure 1.

The system's two transient recorders were connected to \dot{D} and \dot{I} sensors for flight 82-010, \dot{D} and I sensors for flights 82-013 through 82-028, \dot{D} and \dot{B} sensors for flights 82-029 through 82-042, and \dot{I} and I sensors for flights 82-043 through 82-047. Measurement ranges and thresholds are shown in table 2.

The two transient recorders operate and 'trigger' independently, and although both recorders capture measurements from the same lightning event, the time scales on the plots are not referenced to the same start time. However, a number of the expanded waveforms have significant characteristics which can be used to align the plots for those events. The waveform pairs which can be compared (overlaid) in this manner are: Flight 82-037 - Run 4; Flight 82-038 - Runs 2, 4, 7; Flight 82-039 - Run 2; Flight 82-040 - Runs 4, 7; Flight 82-042 - Runs 2, 4, 6, 9 and Flight 82-044 - Runs 1, 2, 3, 4.

A recurring problem in the electronics of one of the transient recorders created periodic discontinuities in some of the recorded waveforms. These data samples were deleted from the plots, leaving gaps in some of the waveforms.

This report also presents lightning current waveforms which were recorded by the Boeing Company developed data logger described in reference 7. The data logger was connected to a current sensor on the pitot boom for all flights.

The maximum recorded values from the 1982 tests are as follows. The maximum current was 8 kA recorded on Flight 82-017, Run 3. The maximum rate of change of current recorded from the \dot{I} sensor on Flight 82-044, Run 4 exceeded the full-scale range of 4.76×10^{10} A/s; the maximum rate of change of current derived graphically from the leading edge of the simultaneously

recorded current waveform was 8.8×10^{10} A/s. The maximum \dot{B} (Flight 82-038, Run 7) was approximately ± 800 T/s and the maximum \dot{D} (Flight 82-017, Run 2) was 13 A/m^2 . Much of the data exhibits the several aircraft resonances (ref. 8) which are in the range of about 6 MHz to 25 MHz.

REFERENCES

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2. Pitts, Felix L.; and Thomas, Mitchel E.: 1981 Direct Strike Lightning Data. NASA TM 83273, Mar. 1982.
3. Thomas, Mitchel E.: ,Direct Strike Lightning Measurement System, AIAA/SETP/SFTE/SAE, 1st Flight Testing Conference, Las Vegas, Nevada, Nov. 1981. AIAA 81-2513.
4. Thomas, Robert M., Jr.: Expanded Interleaved Solid-State Memory of a Wide Bandwidth Transient Waveform Recorder. NASA CP-2128, FAA-RD-8-30. Lightning Technology, NASA Langley Research Center, April 22-24, 1980, p. 119.
5. Trost, Thomas F.; and Zaepfel, Klaus P.: Broadband Electromagnetic Sensors for Aircraft Lightning Research. op.cit., p. 131.
6. Pitts, Felix L.: Electromagnetic Measurement of Lightning Strikes to Aircraft. AIAA Journal of Aircraft, Vol. 19, No. 3, Mar. 1982, pp. 246-250.
7. Von Bokern, G. J.; Piszker, L. D.; and Brick, R. D.: In-Flight Lightning Data Measurement System for Fleet Application, FAA-RD-28-83, FAA/Georgia Institute of Technology Workshop on Grounding and Lightning Protection. May 1978, pp. 345-363.
8. Trost, Thomas F.; and Pitts, Felix L.: Analysis of Electromagnetic Fields on an F-106B Aircraft During Lightning Strikes. International Aerospace Conference on Lightning and Static Electricity. St. Catherine's College, Oxford, England. March 23-25, 1982, p. B3-0.

TABLE 1. 1982 LIGHTNING DATA SUMMARY

DATE	FLIGHT NUMBER	\dot{D}_F		\dot{B}_L		\dot{I}		NUMBER STRIKES
		RUN NUMBERS		RUN NUMBERS		RUN NUMBERS		
5/23	82-010	1 thru 3 (a)				2		3
5/28	82-013	1, 3				2 thru 5		5
6/5	82-017	2				2 thru 4		9
6/17	82-020	1 thru 3						2
6/29	82-023	1, 3				2		8
7/4	82-024	1 thru 18				7		14
7/10	82-026	1 thru 3				2(b)		3
7/11	82-027	1 thru 3						2
7/11	82-028	1 thru 8				0(b)		9
7/16	82-029	1, 2						1
7/17	82-030	1 thru 3				1(b)		3
7/28	82-032	1, 2		2				2
7/30	82-034	1 thru 5						6
7/31	82-035	1, 2						1
8/6	82-037	1 thru 4		1 thru 4				2
8/8	82-038	2, 4 thru 8		1 thru 5, 7, 8				8
8/9	82-039	1, 2		1, 2				2
8/9	82-040	1, 3, 4, 6, 7		1 thru 8				10
8/11	82-041	2 thru 4		1, 2, 4 thru 8		6, 8, 18, 20(b)		22
		6 thru 20		10 thru 20				
8/11	82-042	1 thru 9		1 thru 9		5(b)		9
8/17	82-043					1, 2	1, 2	4
8/25	82-044					1 thru 4(c)	1 thru 4	23
9/20	82-047					1	1	2

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- (a) Expanded waveform for RUN 1 not included due to high frequency, low amplitude recorder anomaly.
 (b) Recorded on Boeing data logger.
 (c) RUN 2 and RUN 4 also recorded on Boeing data logger.

TABLE 2. 1982 LIGHTNING MEASUREMENT RANGES

<u>FLIGHT NO.</u>	<u>SENSOR</u>	<u>FULL-SCALE</u>	<u>THRESHOLD</u>	<u>SENSOR</u>	<u>FULL-SCALE</u>	<u>THRESHOLD</u>
82-010	D	$\pm 19.5 \text{ A/m}^2$	-2.93 A/m^2	I	$\pm 47.6 \times 10^9 \text{ A/s}$	$+7.1 \times 10^9 \text{ A/s}$
82-013 to 017	D	$\pm 19.5 \text{ A/m}^2$	-2.93 A/m^2	I	$\pm 12,822 \text{ A}$	$\pm 1923 \text{ A}$
82-020 to 028	D	$\pm 9.76 \text{ A/m}^2$	-1.46 A/m^2	I	$\pm 12,822 \text{ A}$	$\pm 1923 \text{ A}$
82-029 to 042	D	$\pm 11.0 \text{ A/m}^2$	-1.65 A/m^2	B	$\pm 877 \text{ T/s}$	-132 T/s
82-043 to 047	I	$\pm 11,423 \text{ A}$	$+1713 \text{ A}$	I	$\pm 47.6 \times 10^9 \text{ A/s}$	$+7.1 \times 10^9 \text{ A/s}$

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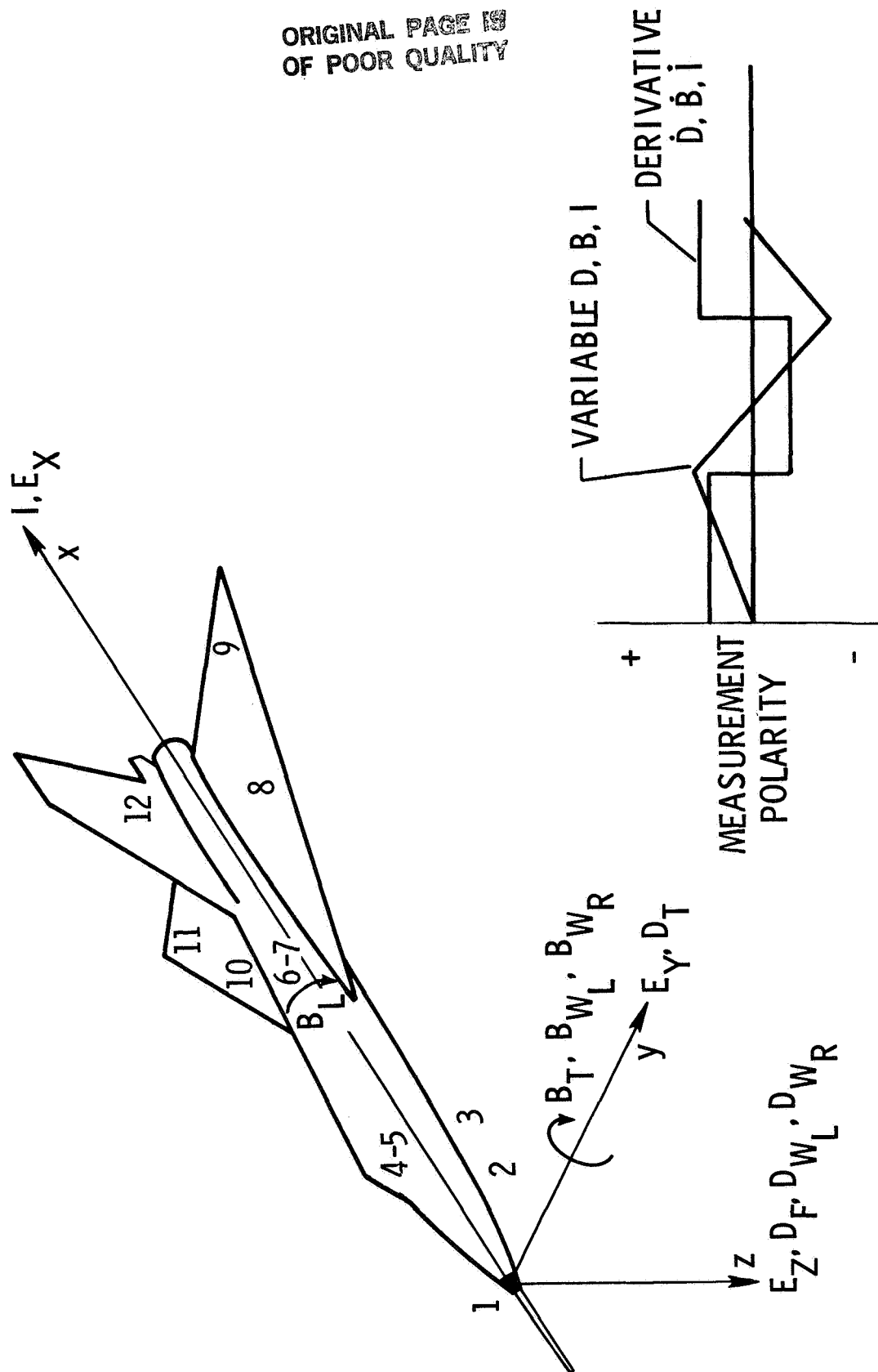
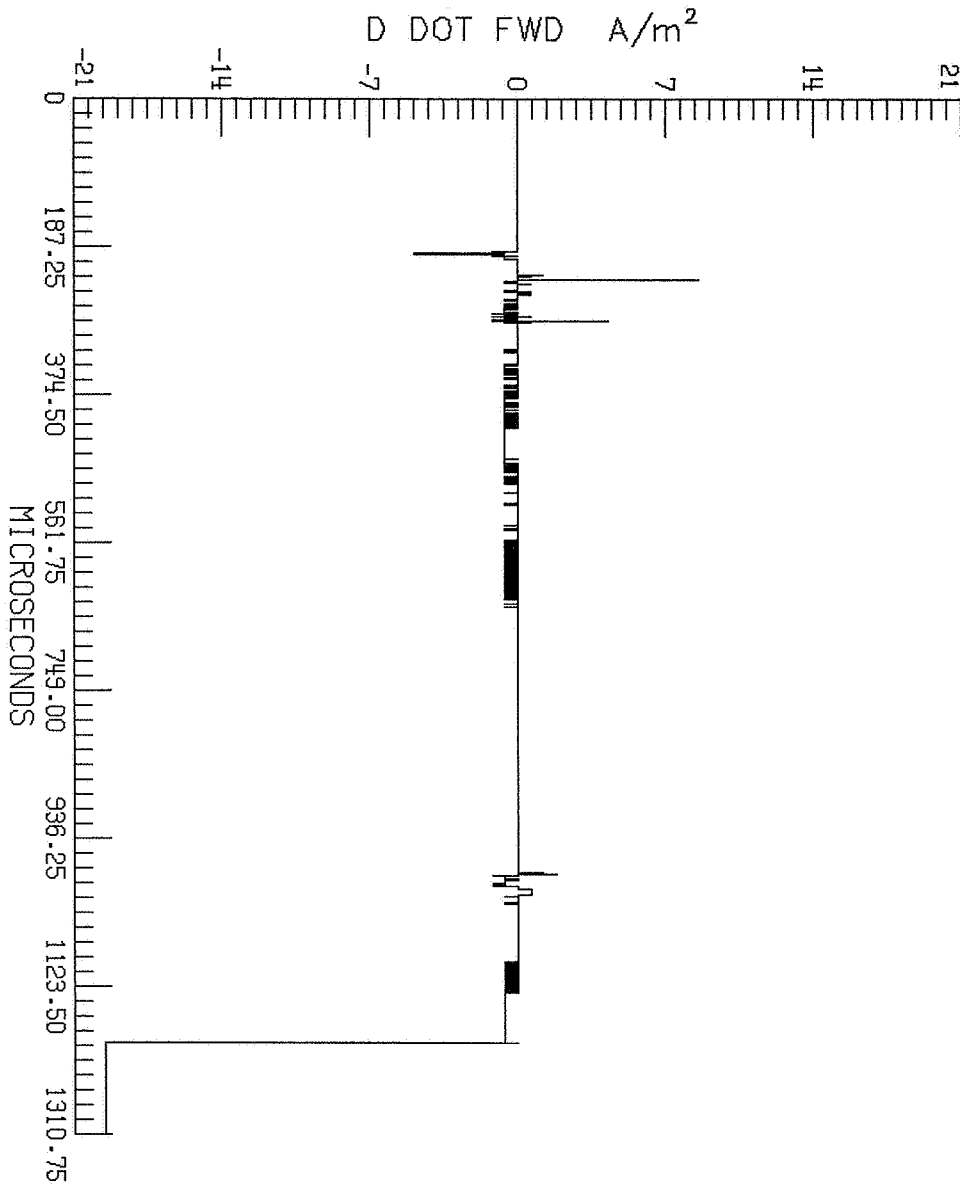


Figure 1. - Electromagnetic sign conventions and sensor locations.

F106/TK 10/82-010/THOMAS

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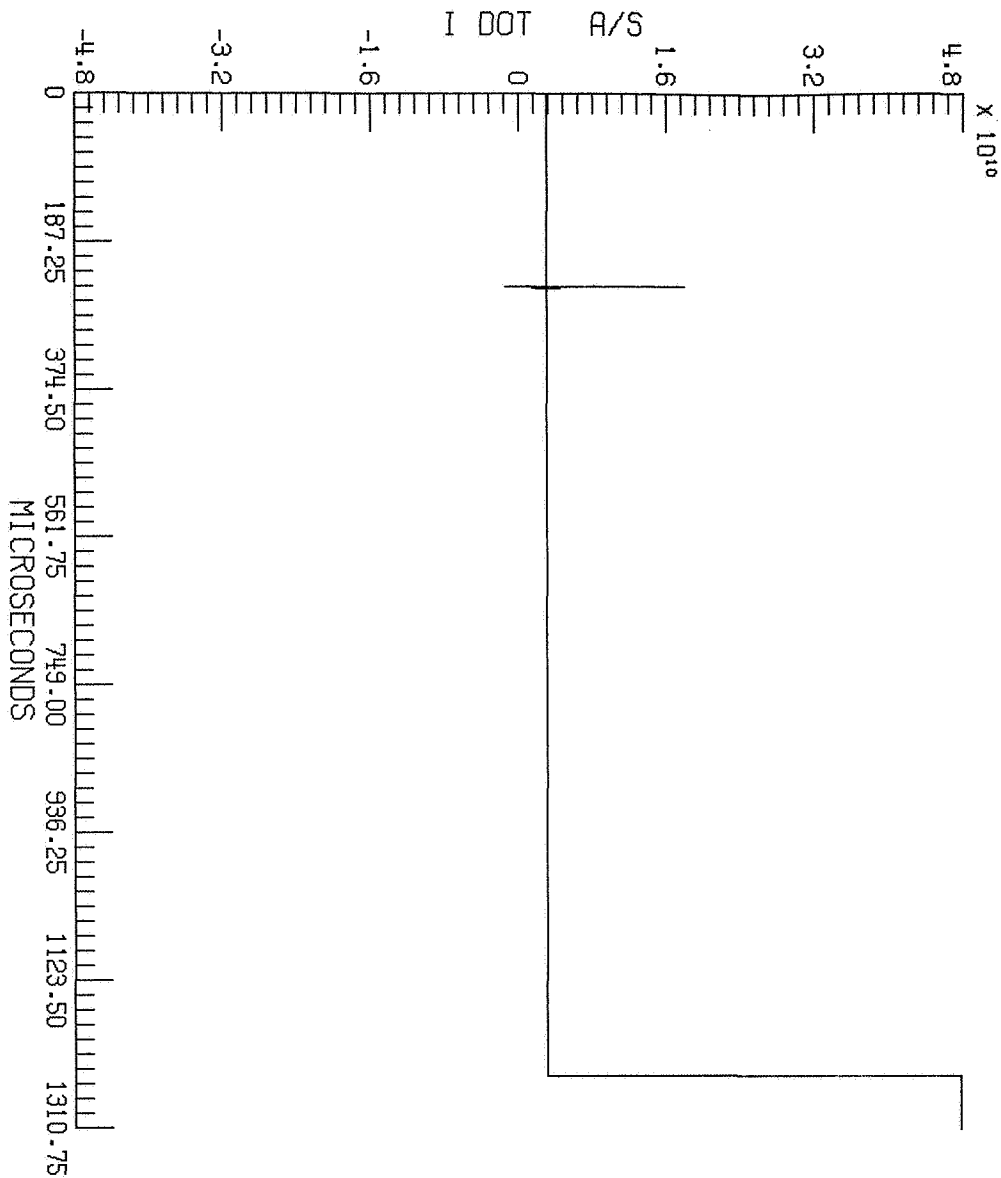


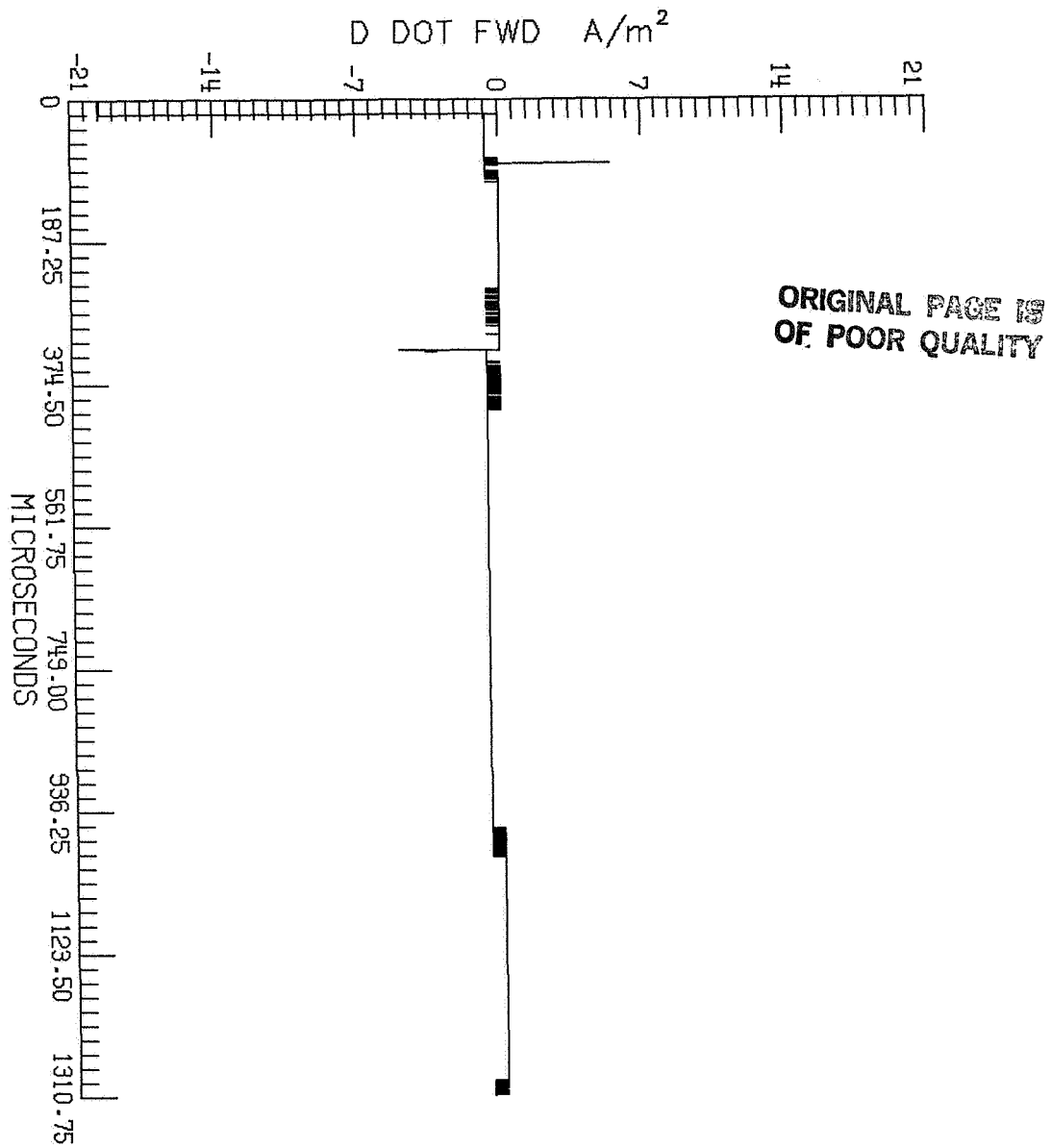
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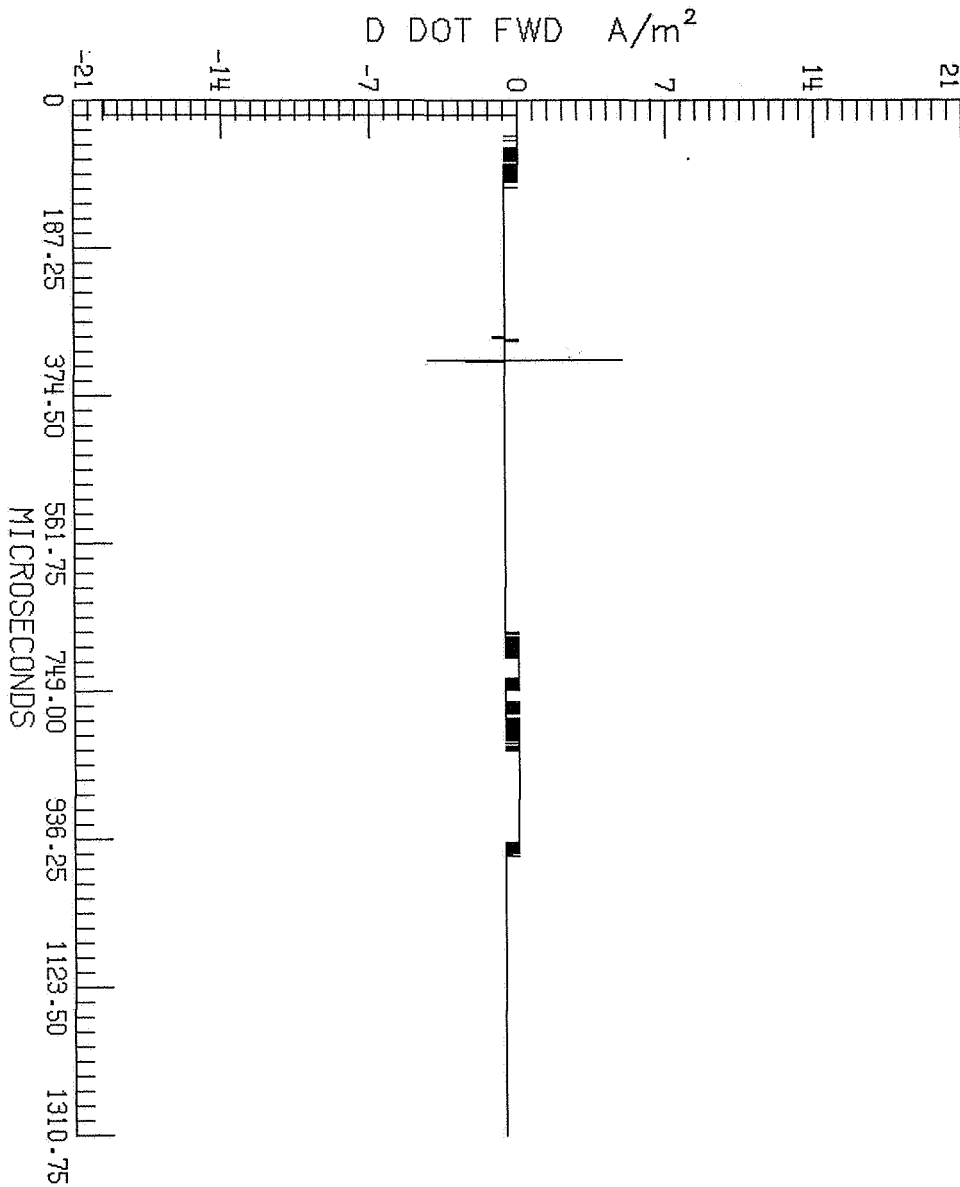


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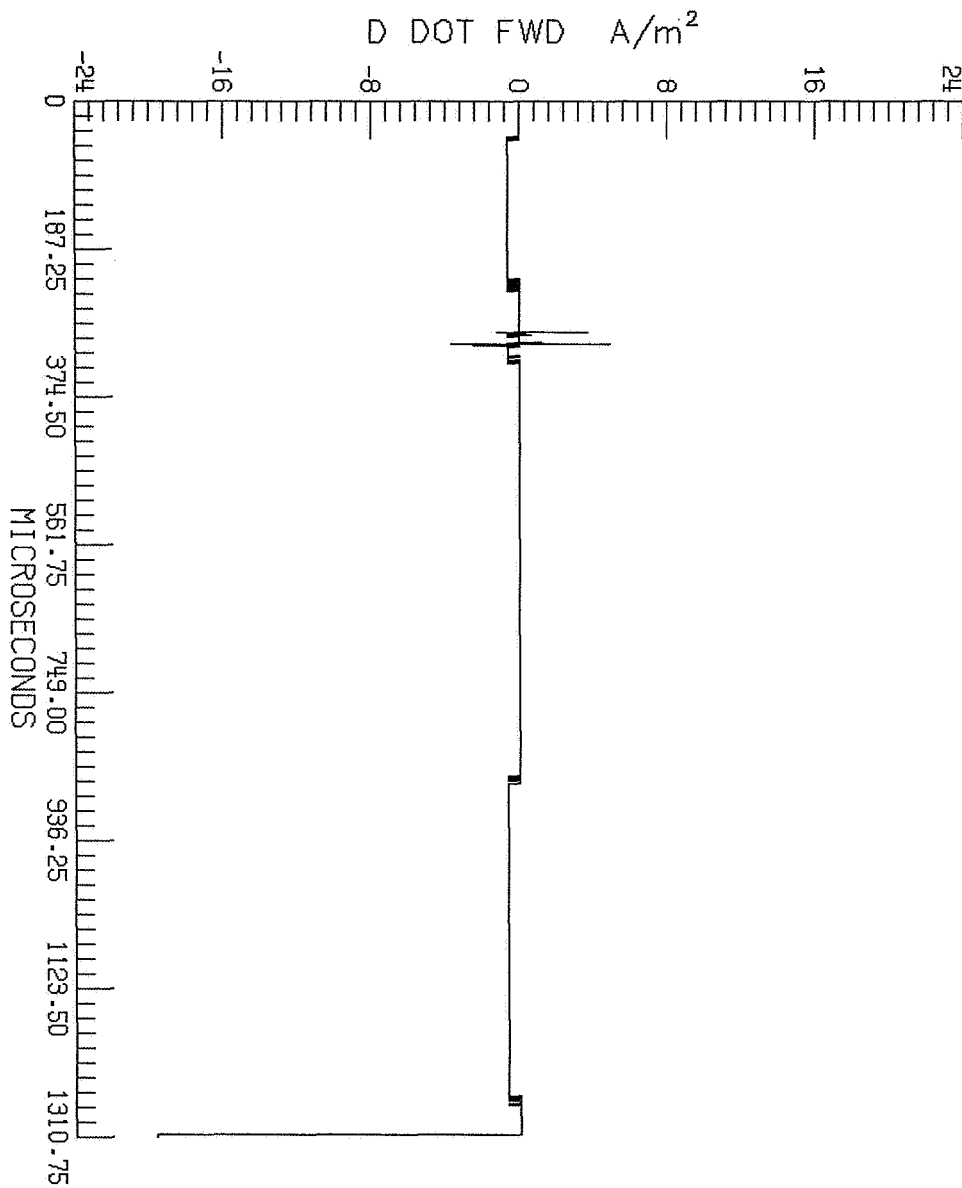
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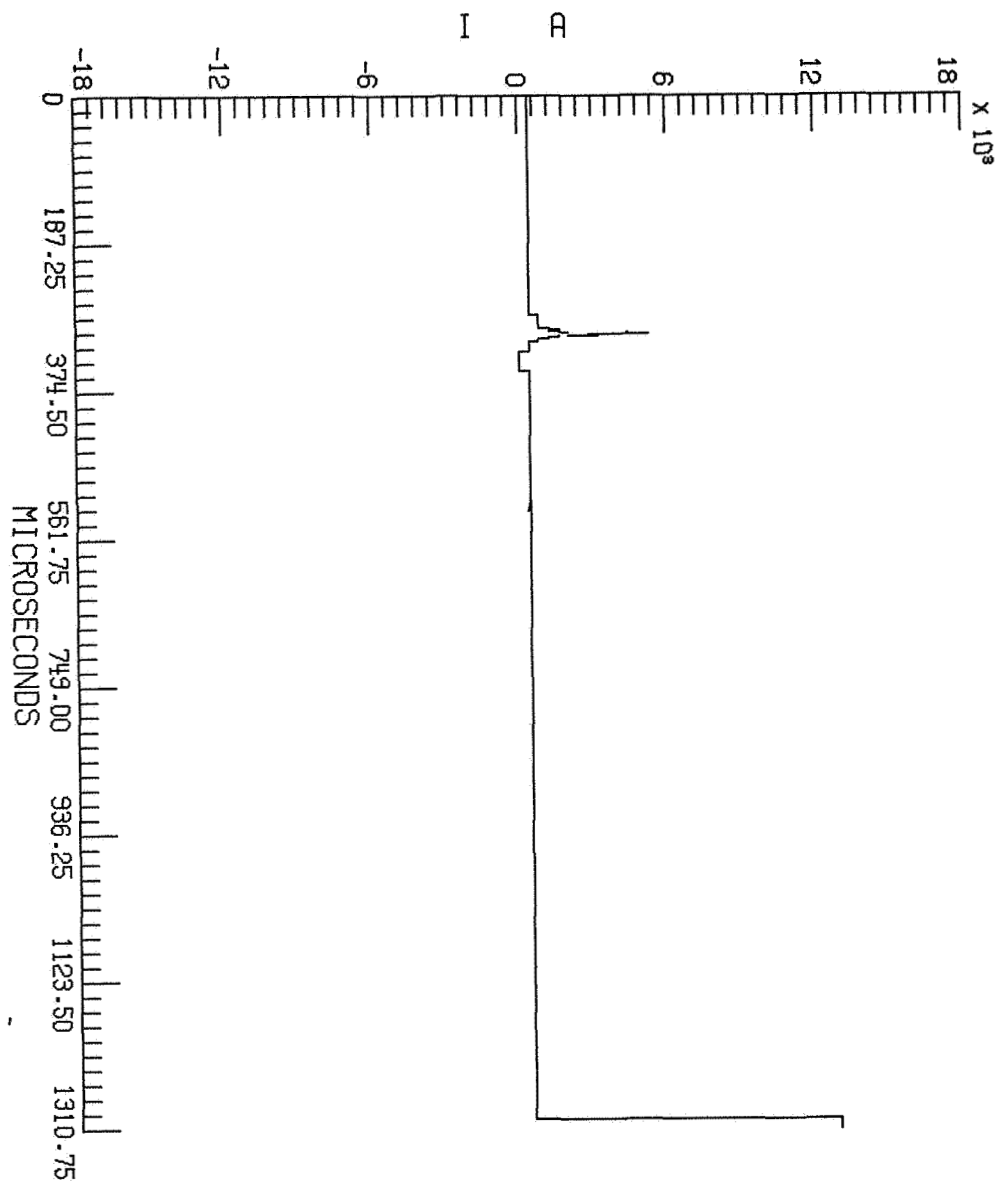
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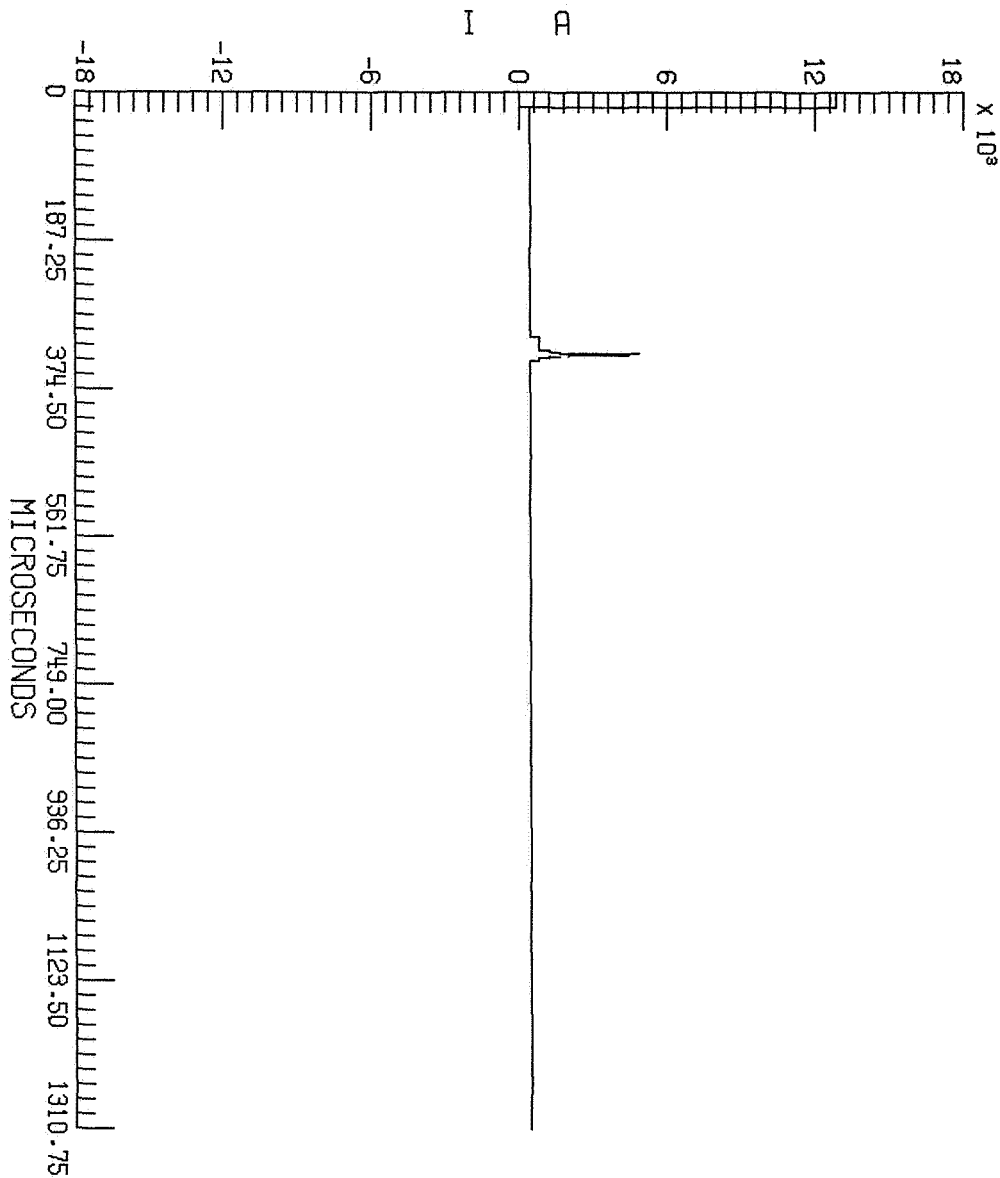
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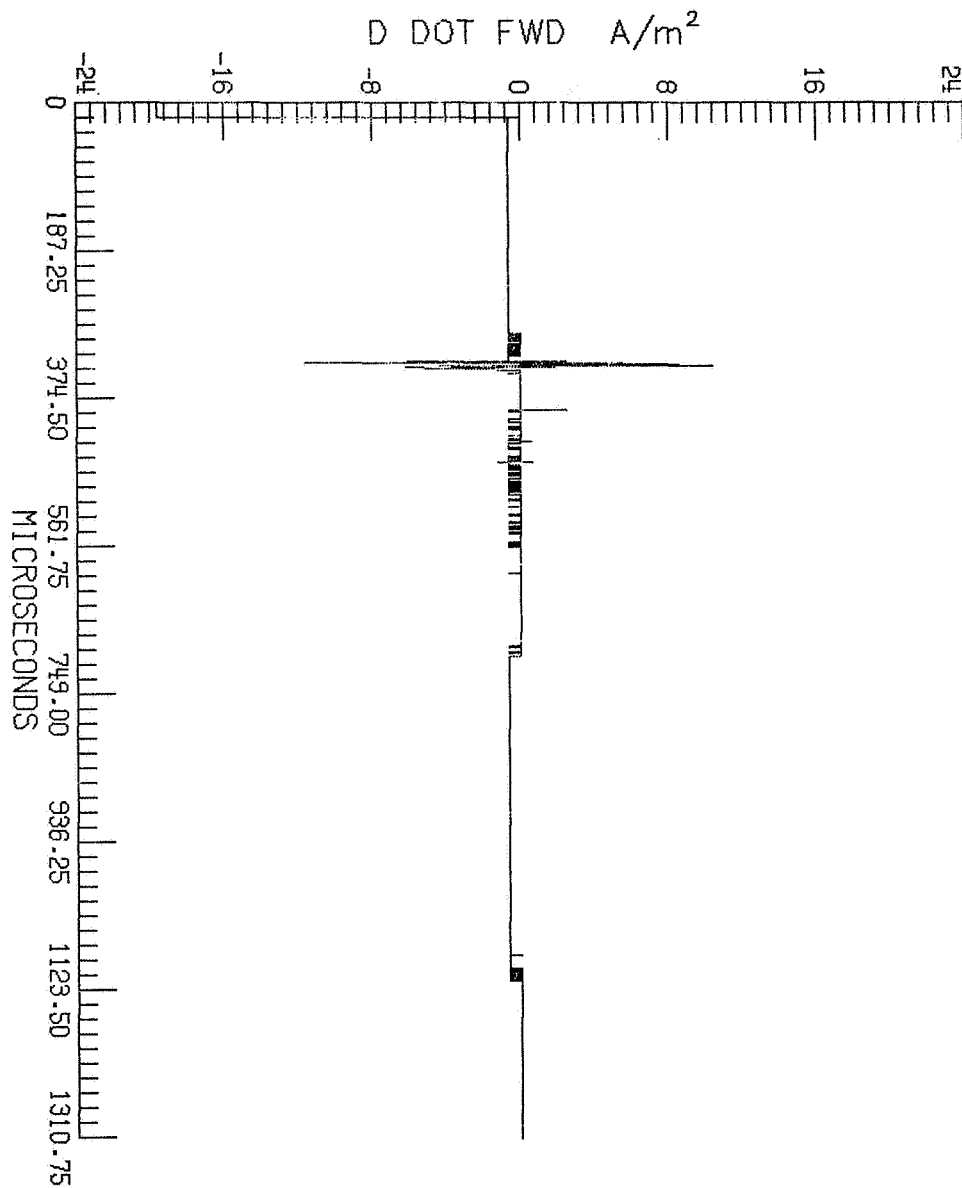
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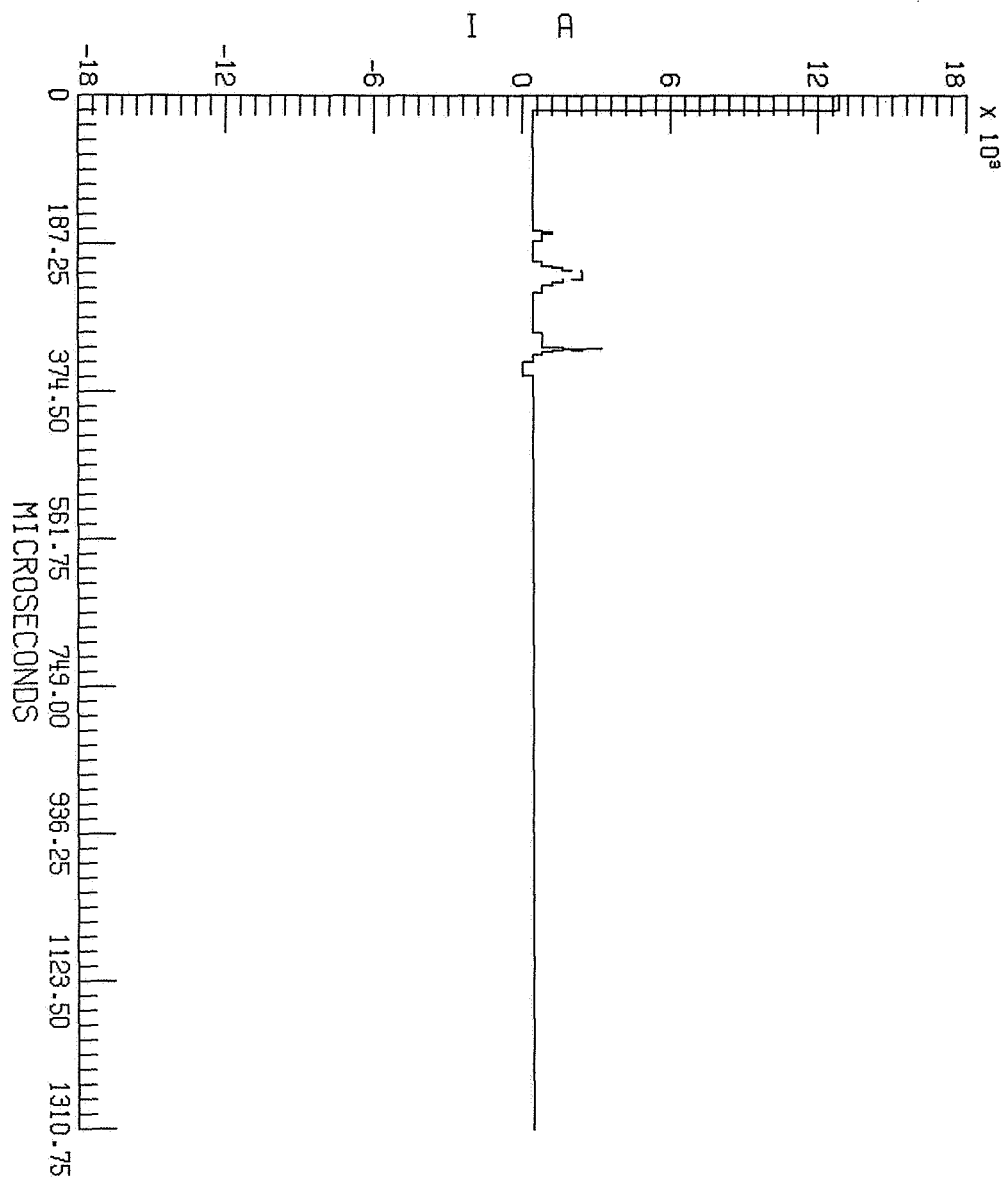
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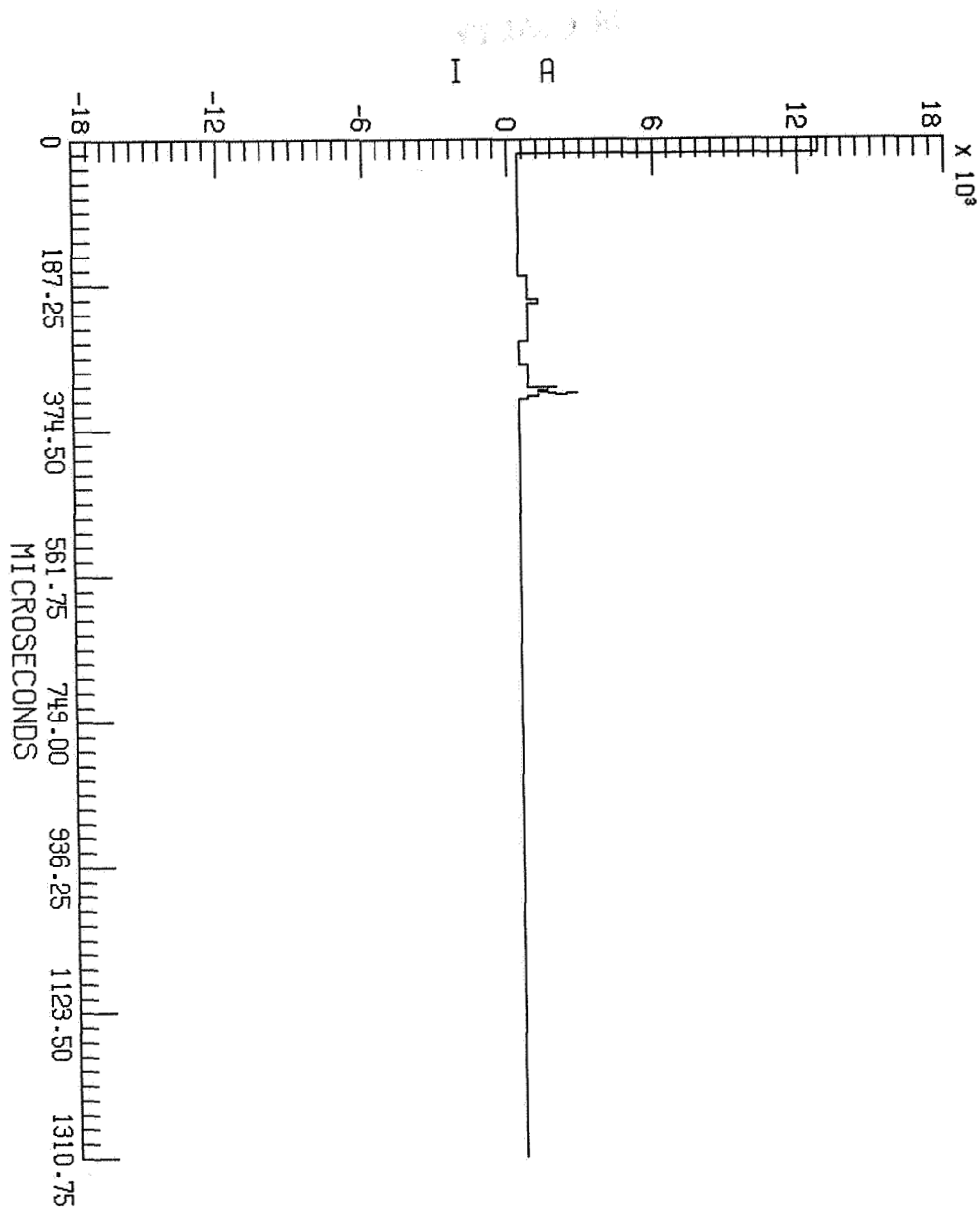


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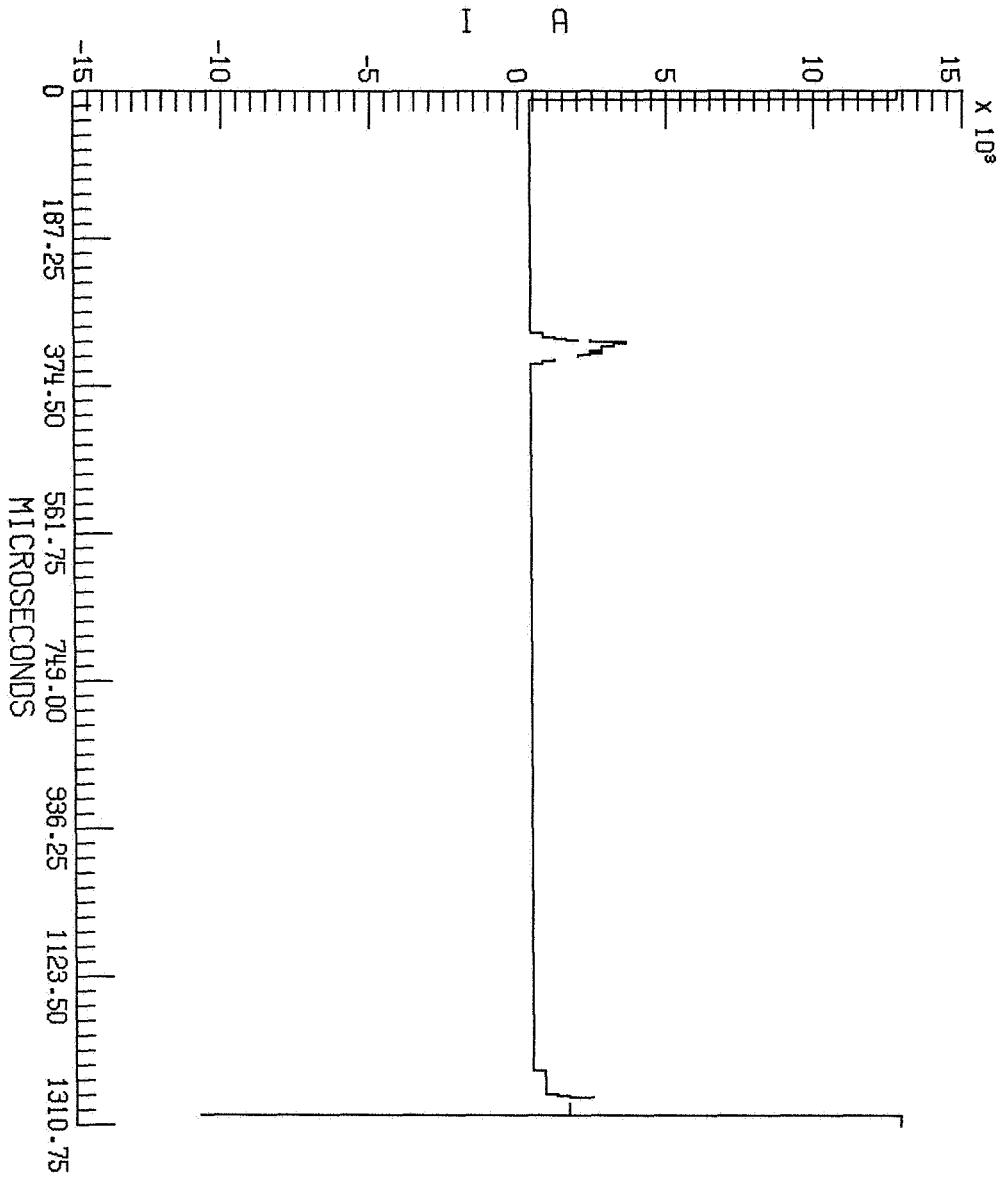
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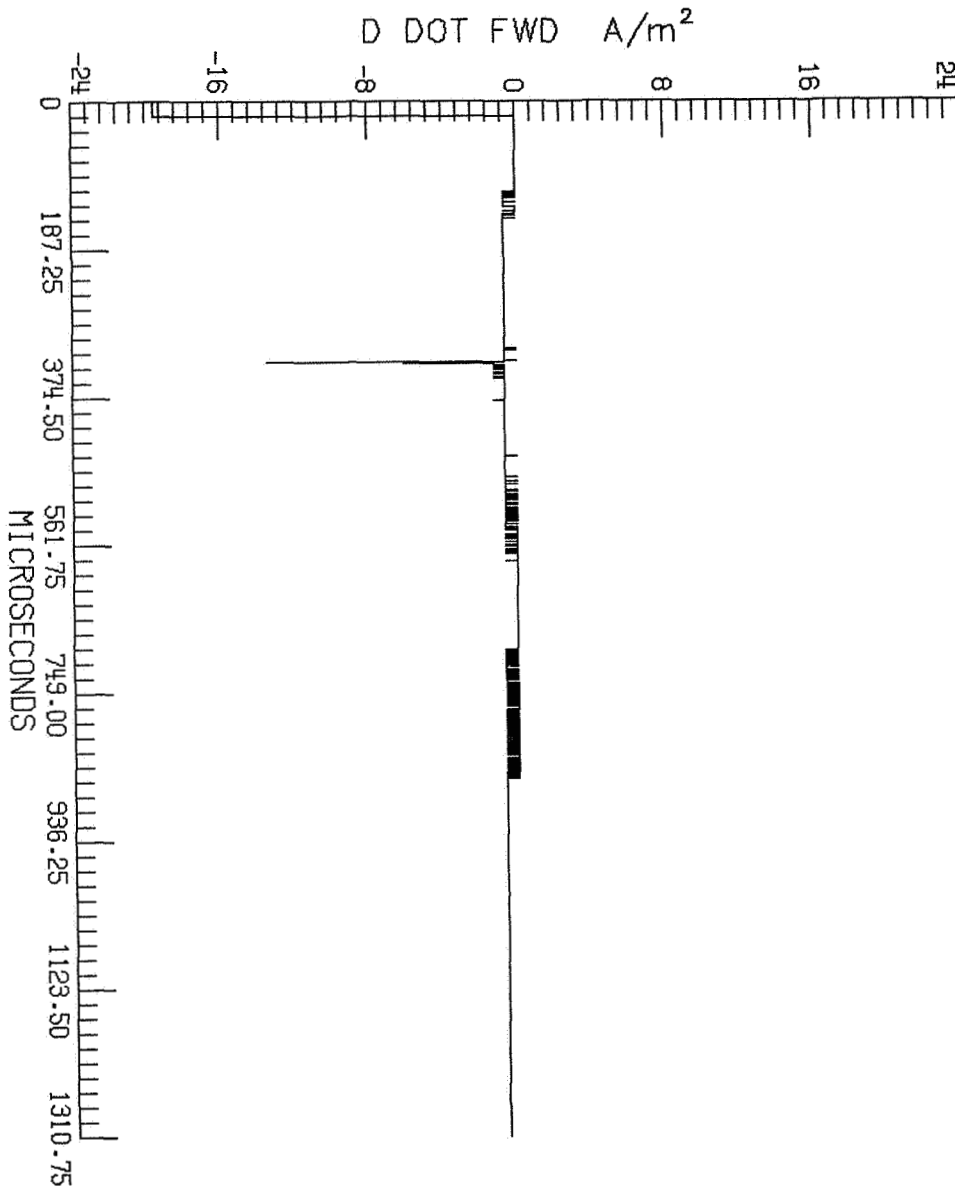


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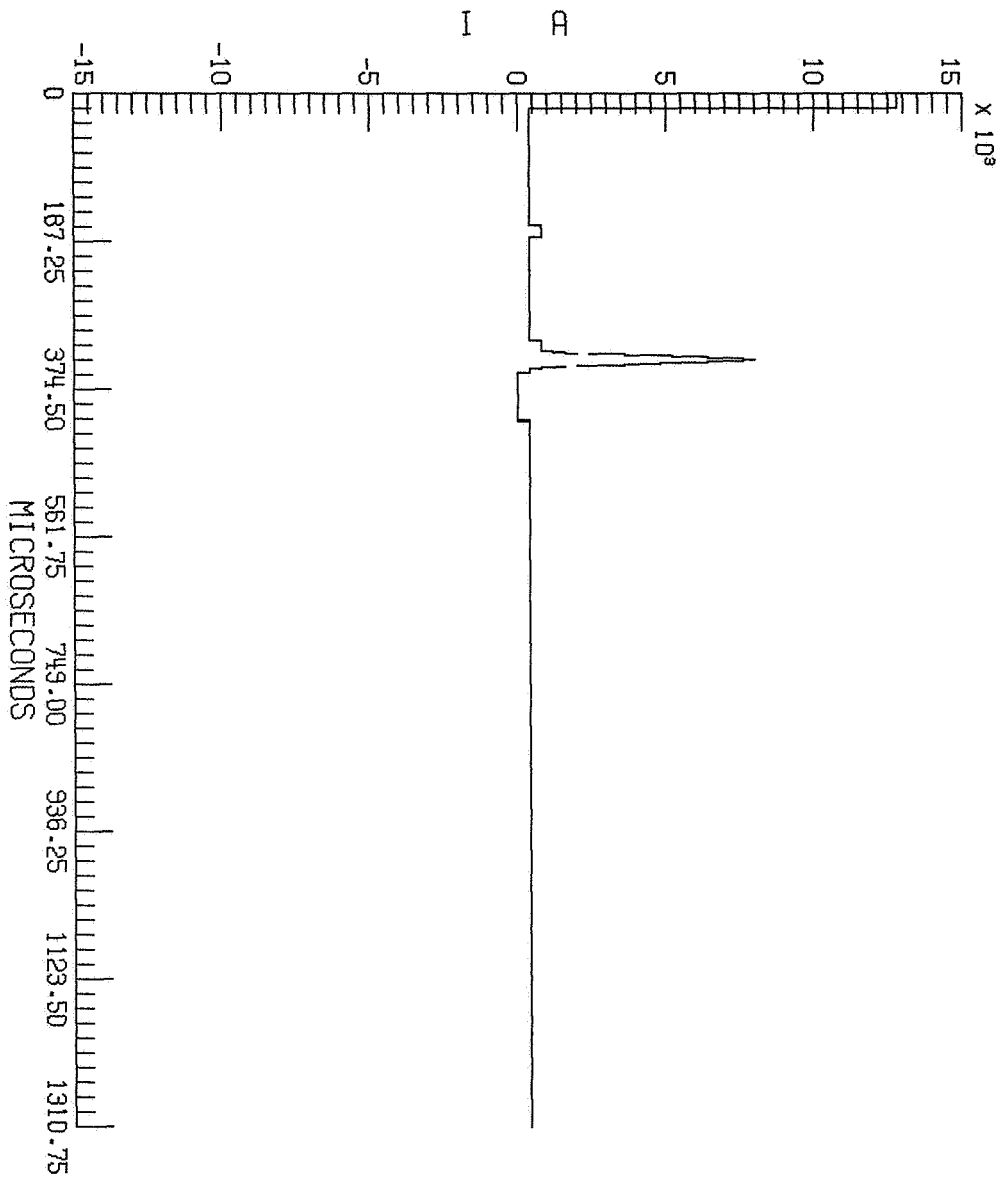
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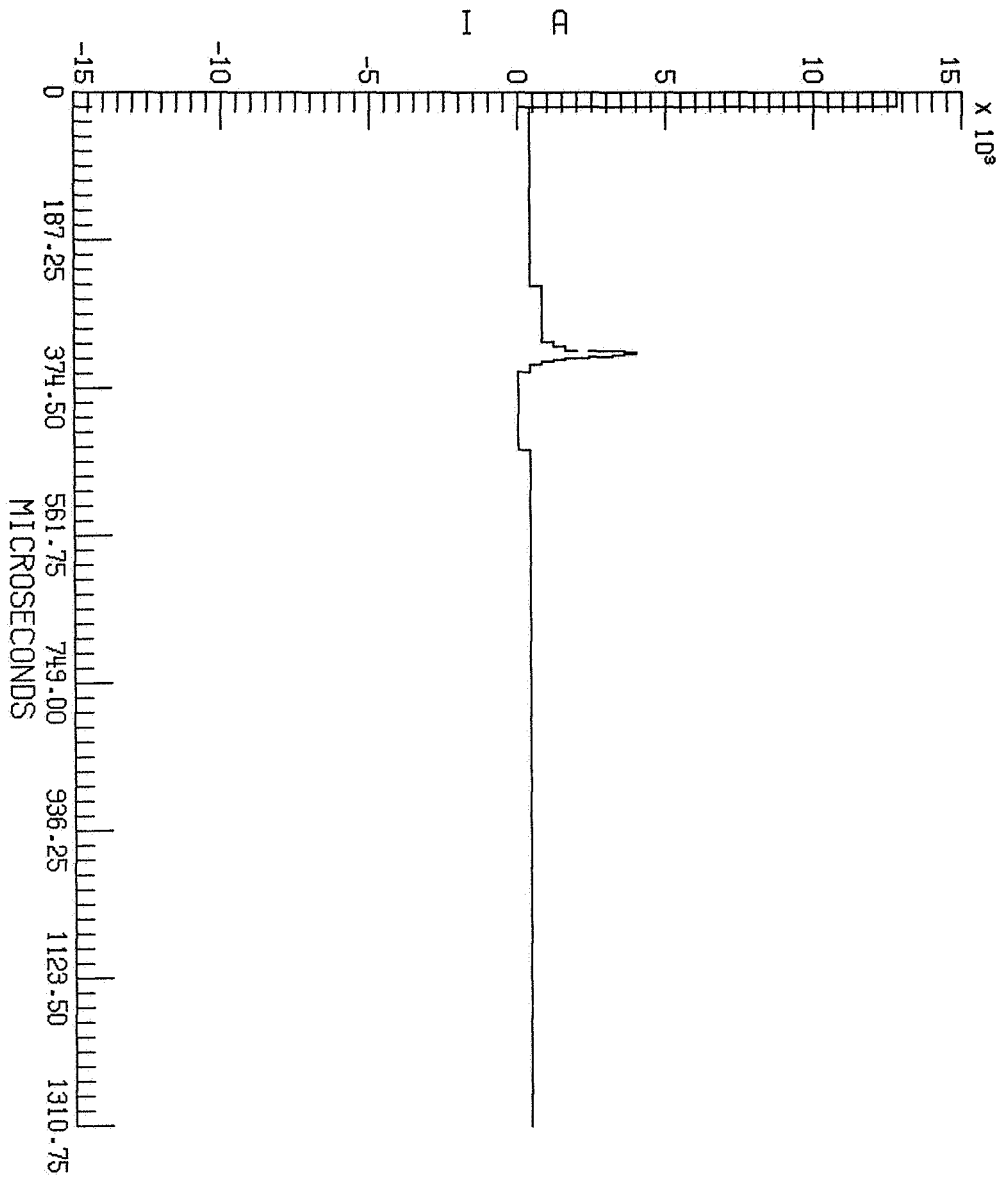
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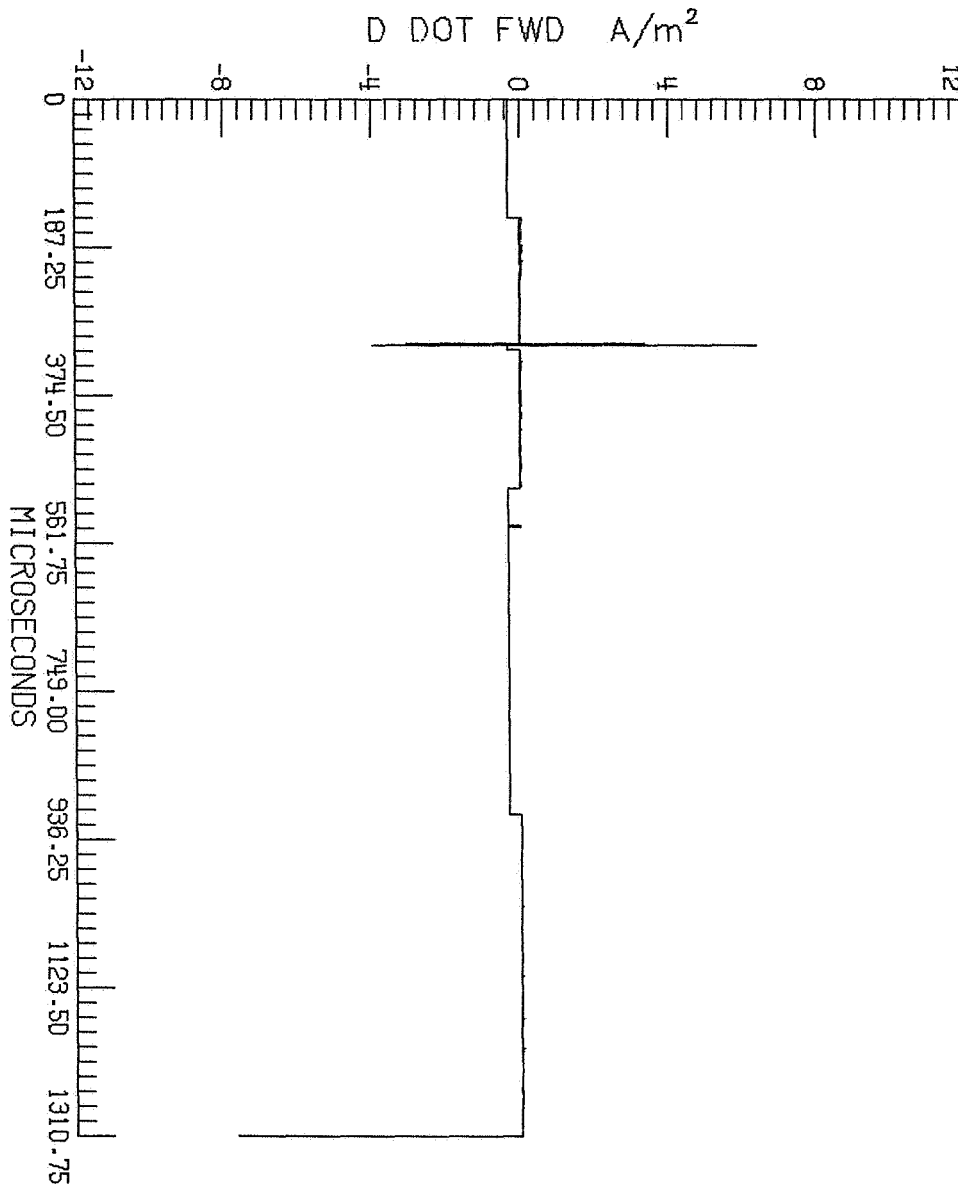


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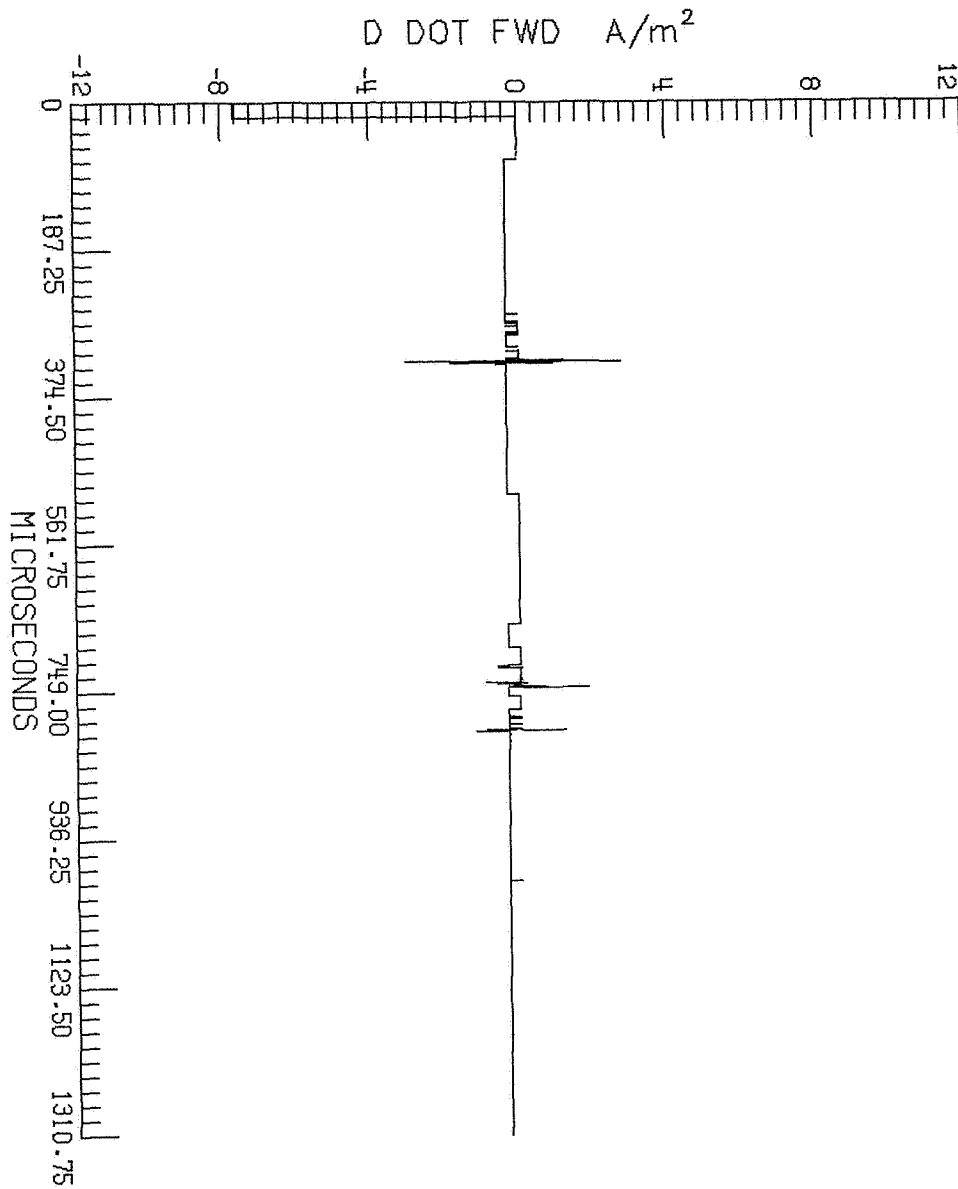
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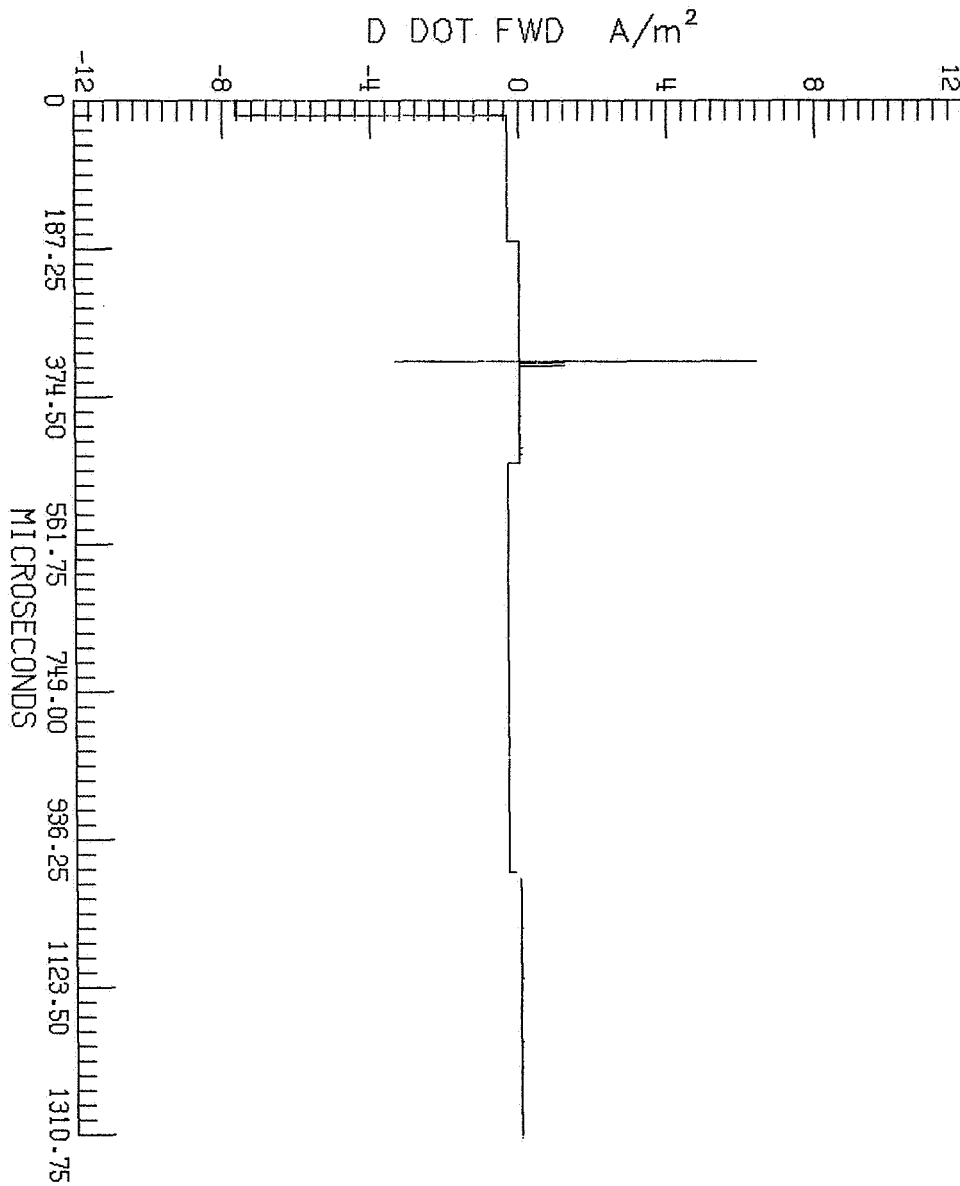


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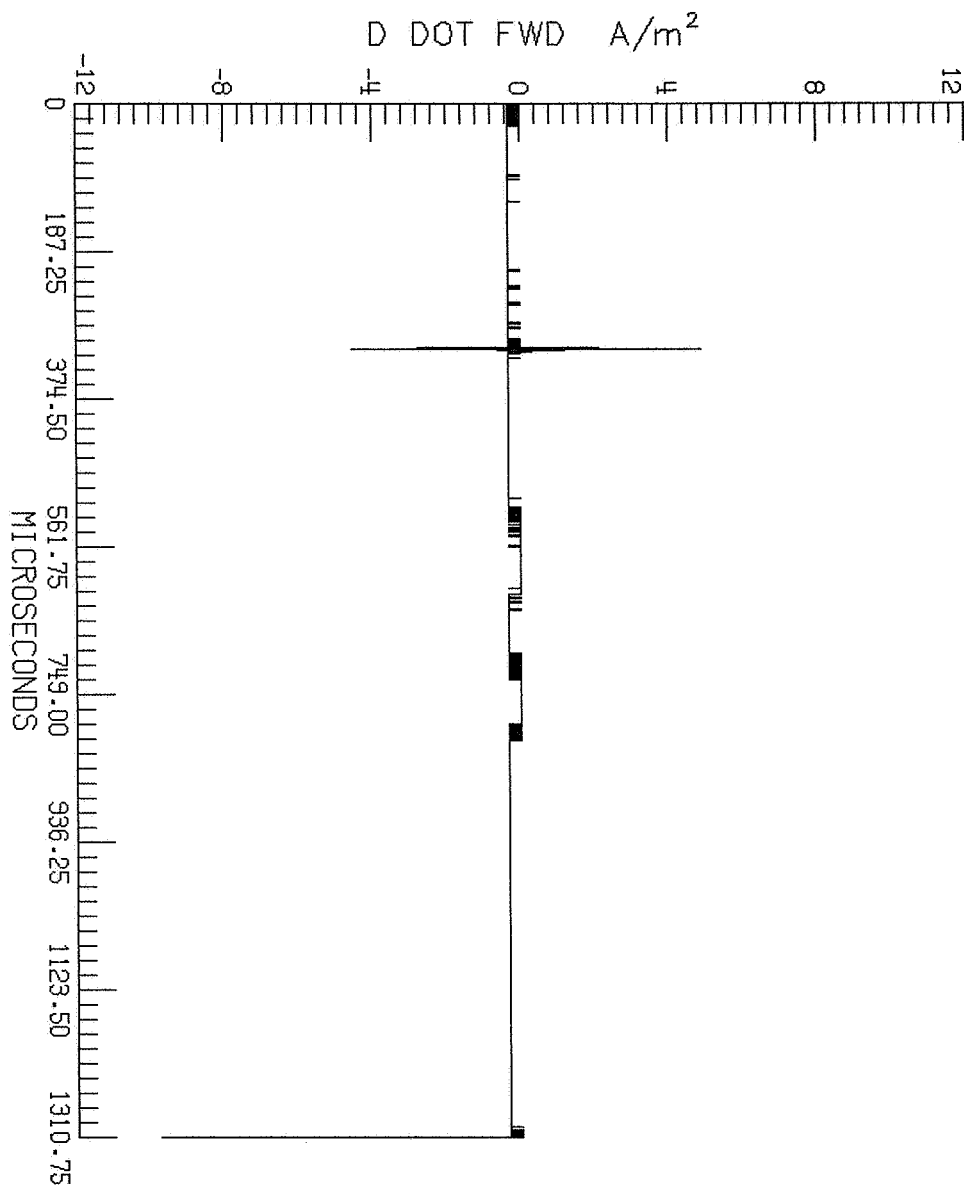
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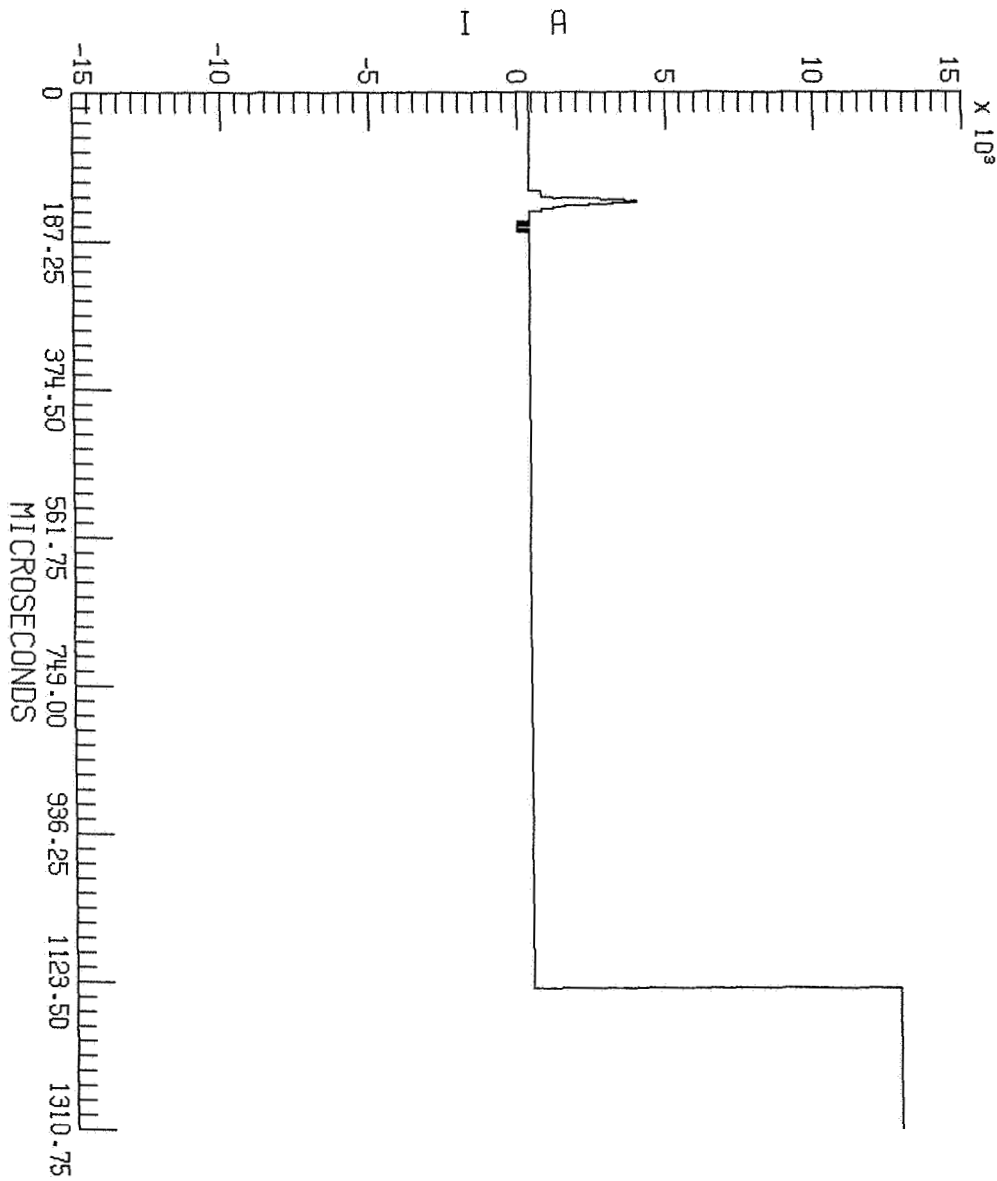


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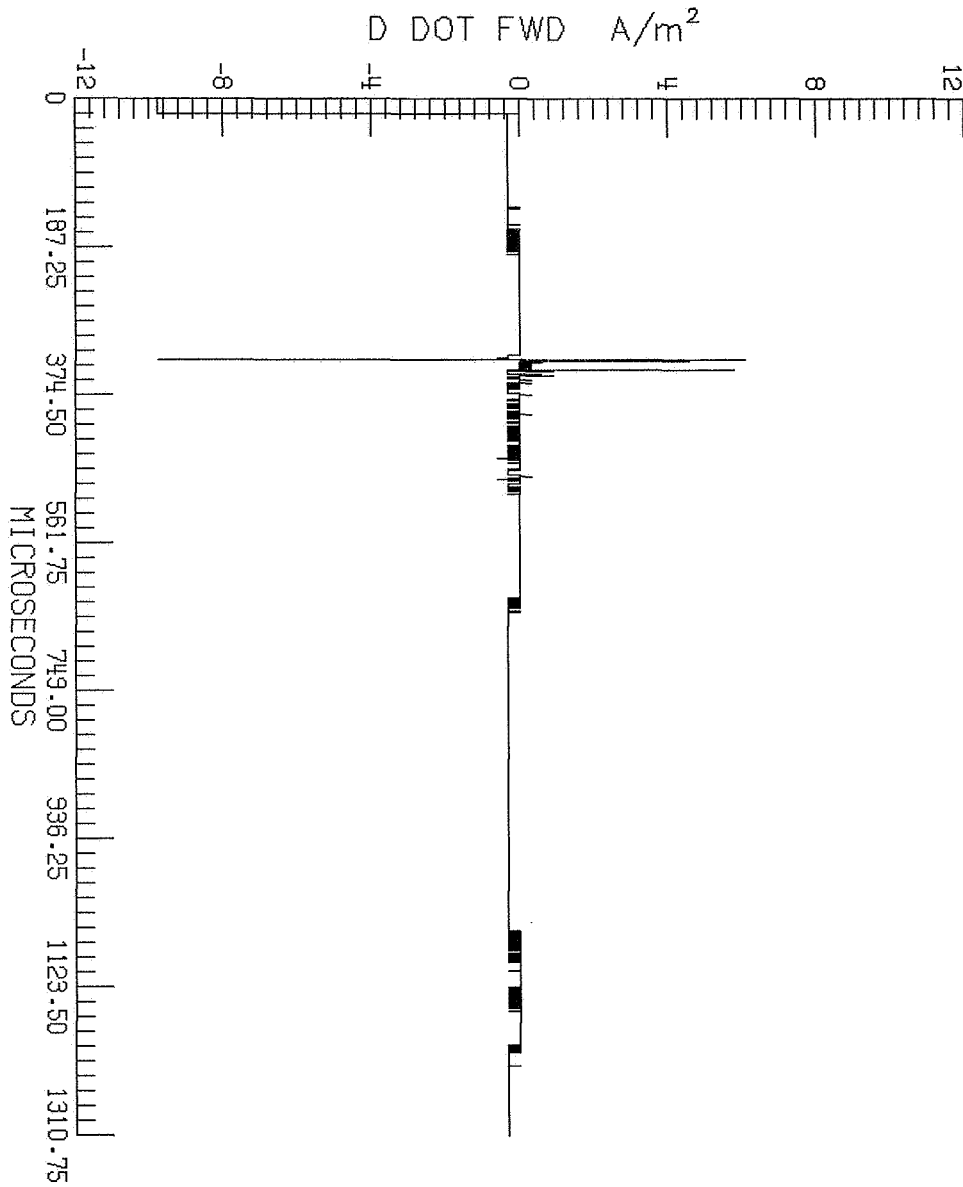


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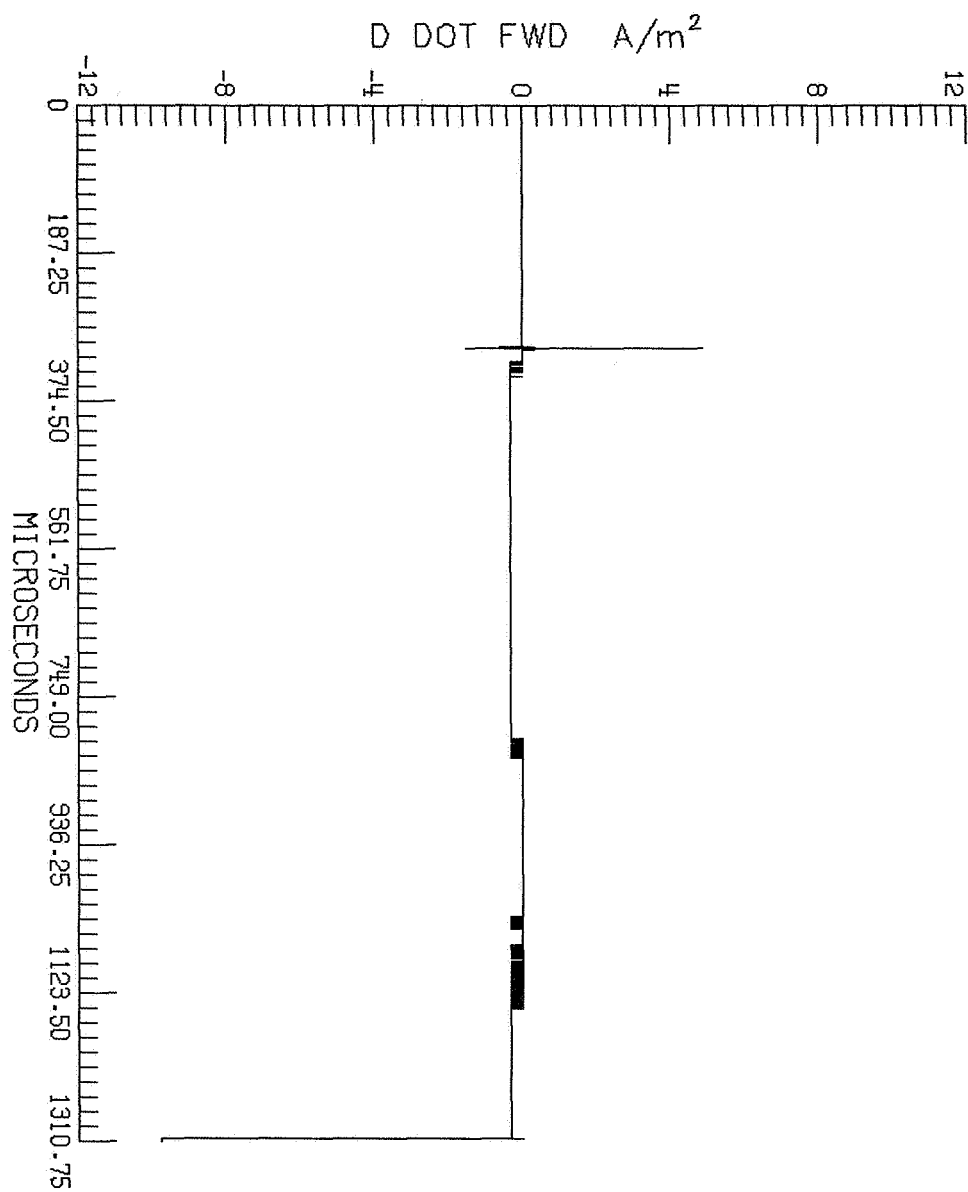
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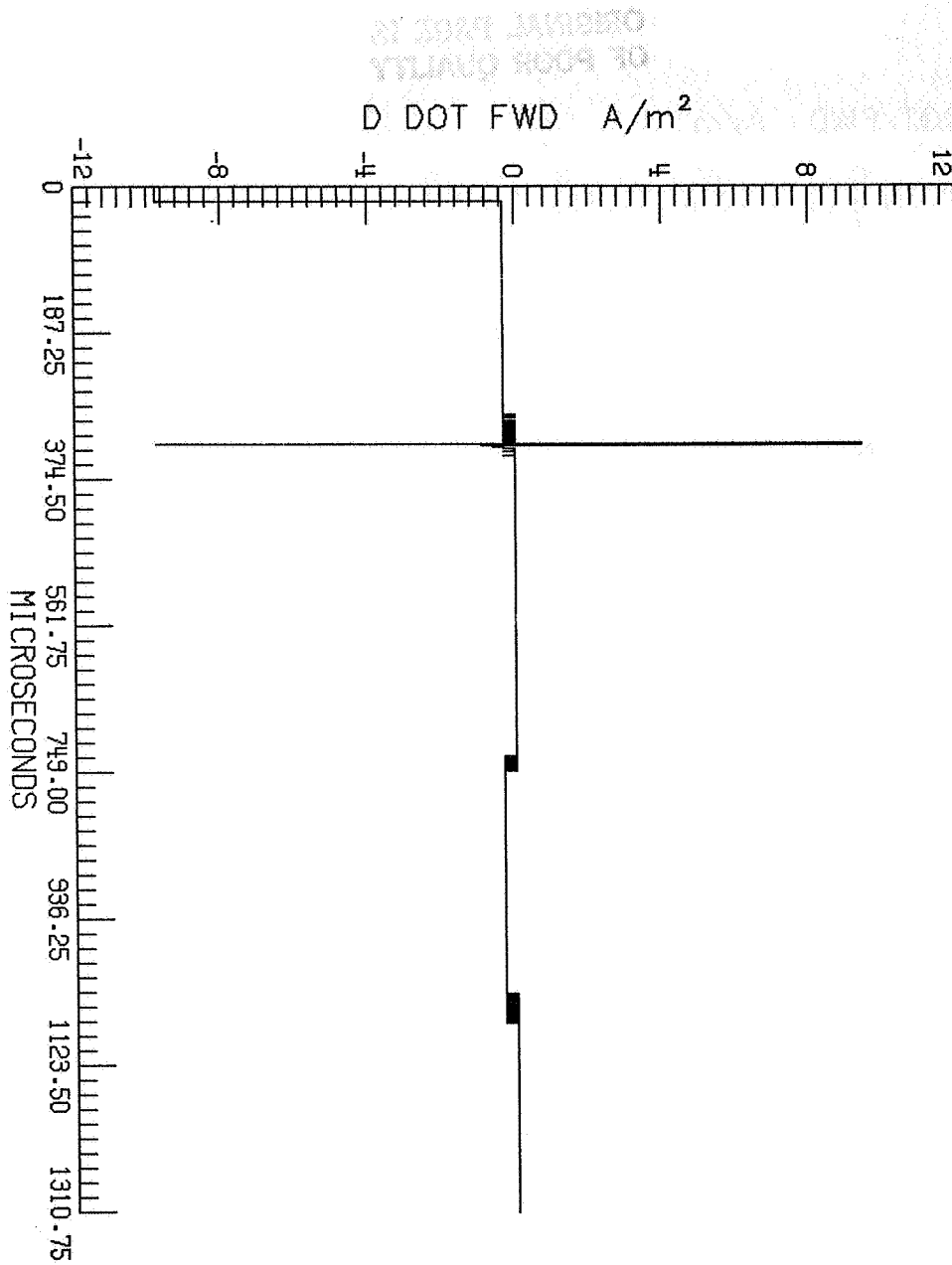


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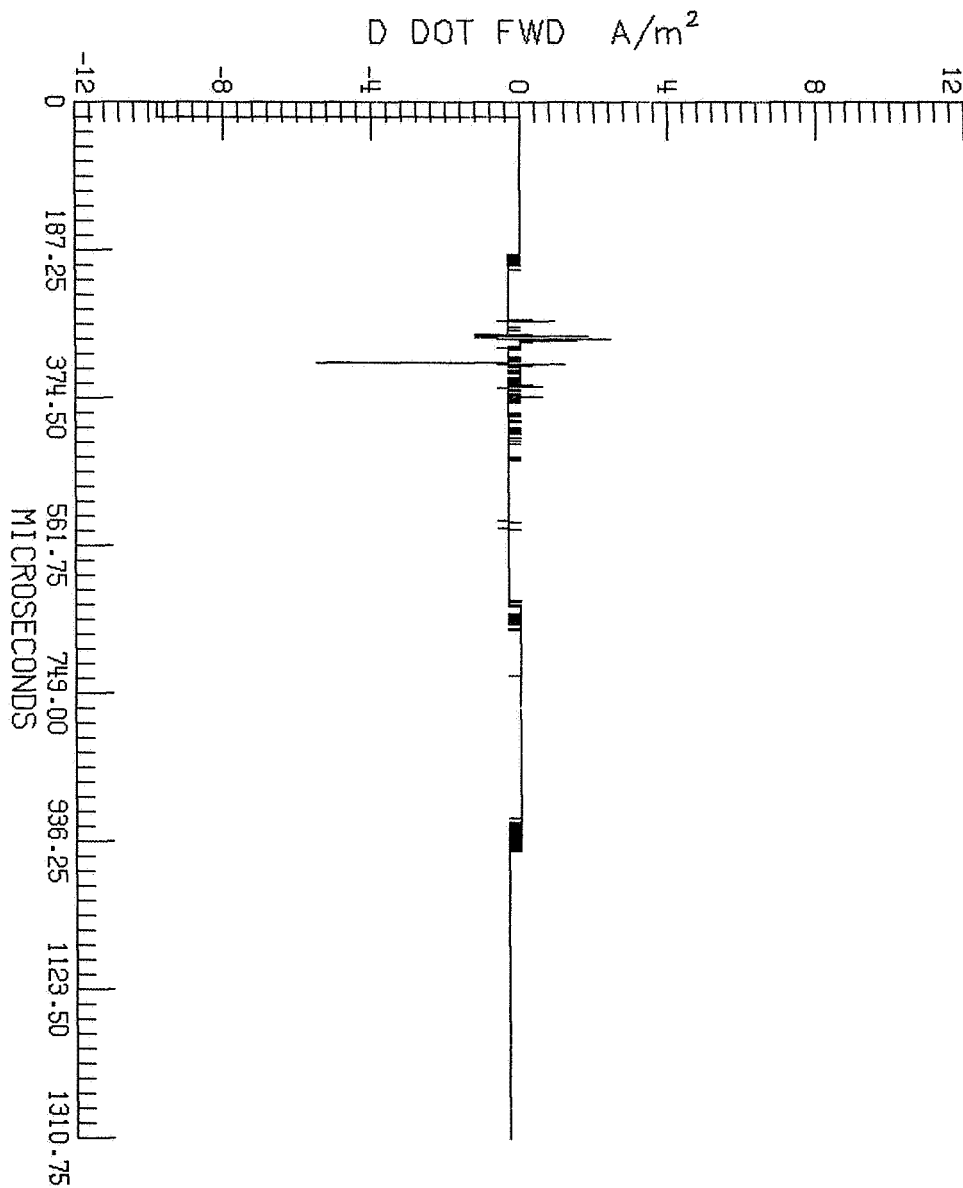


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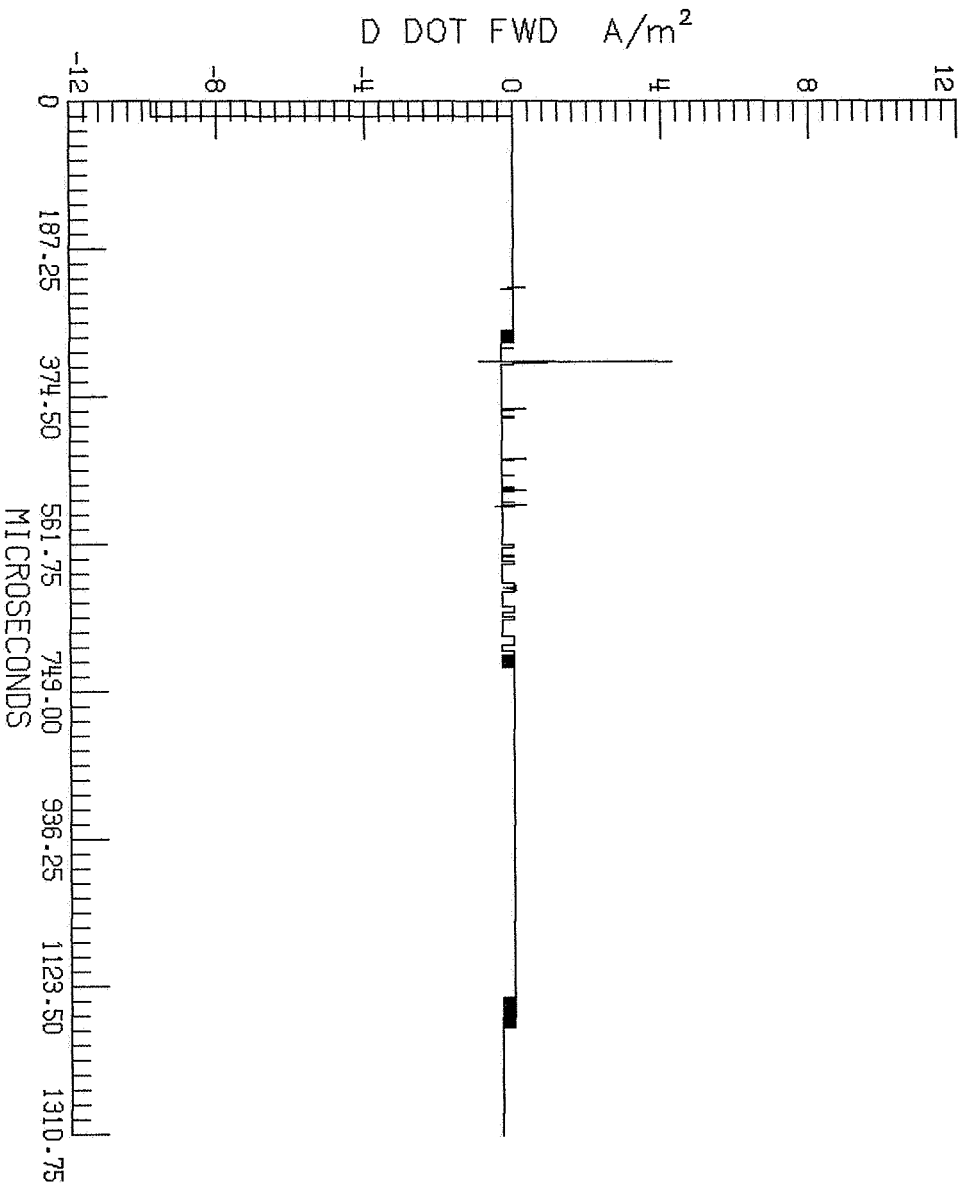
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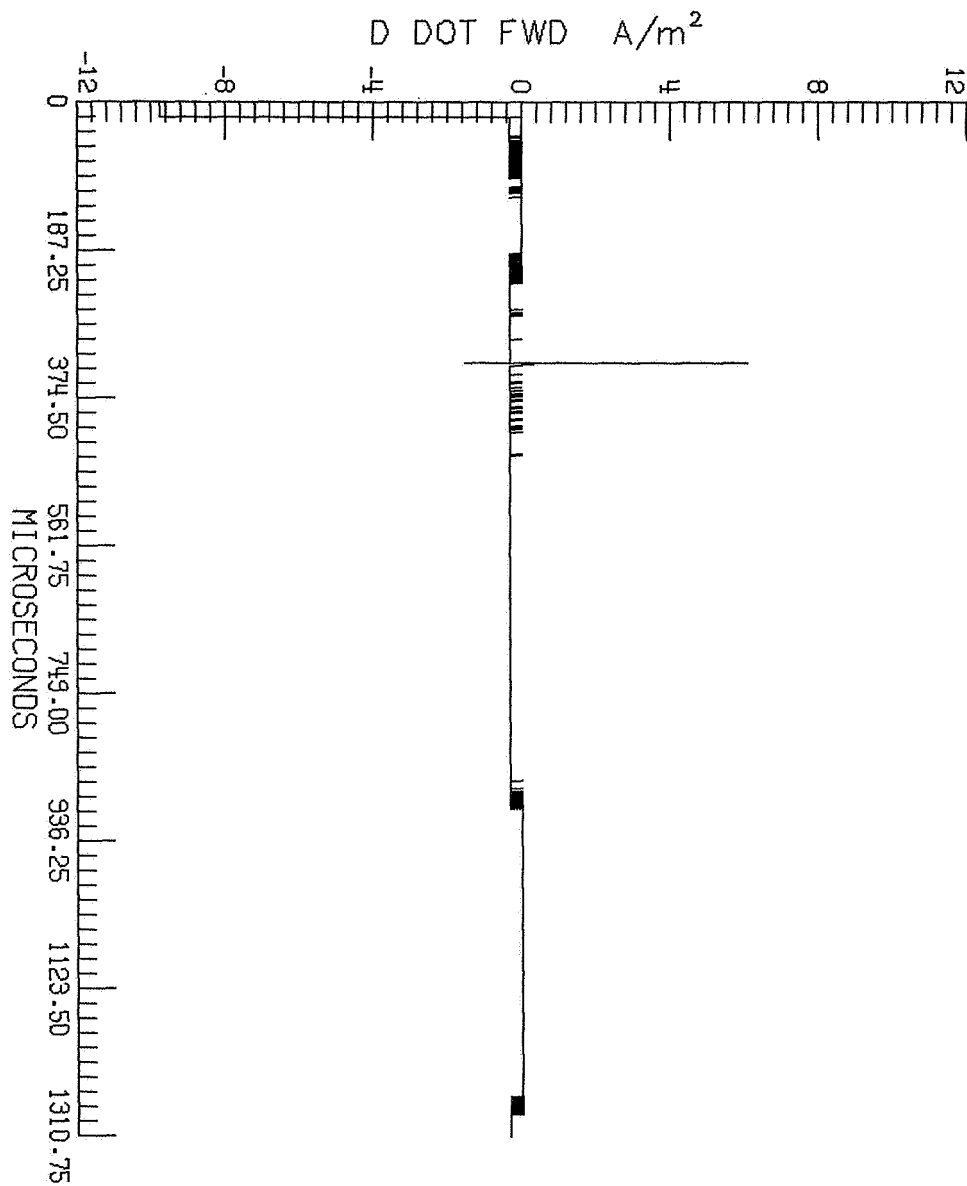


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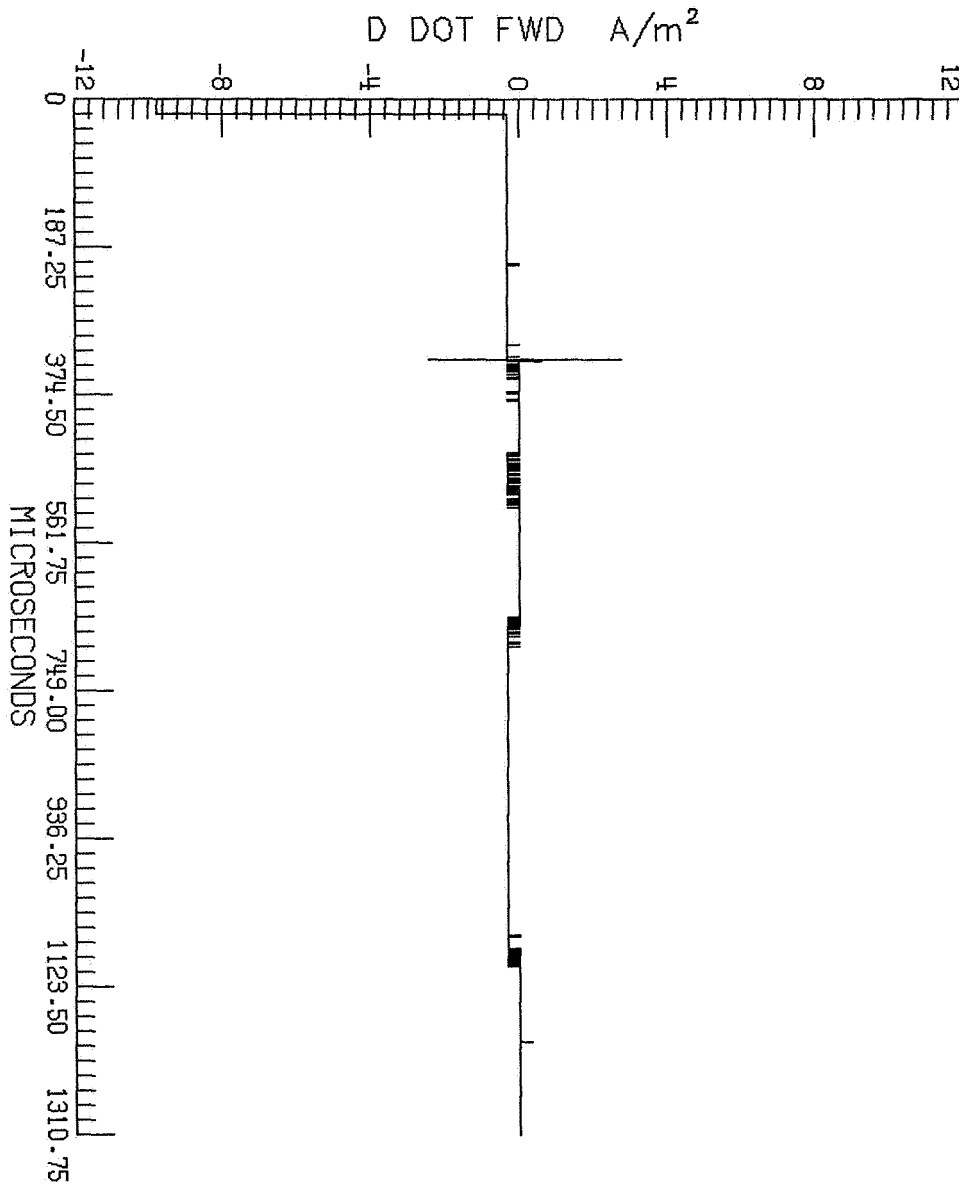


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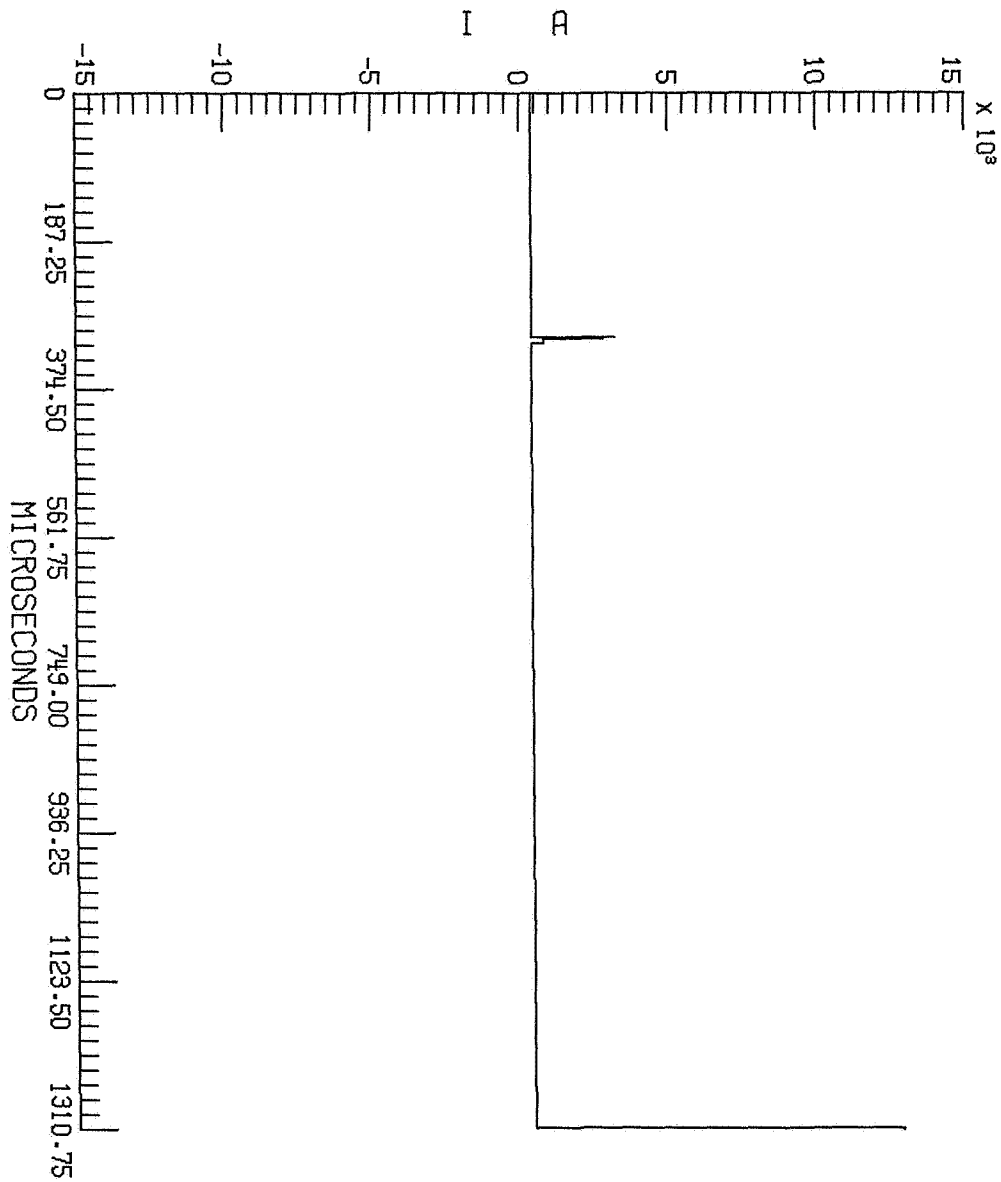


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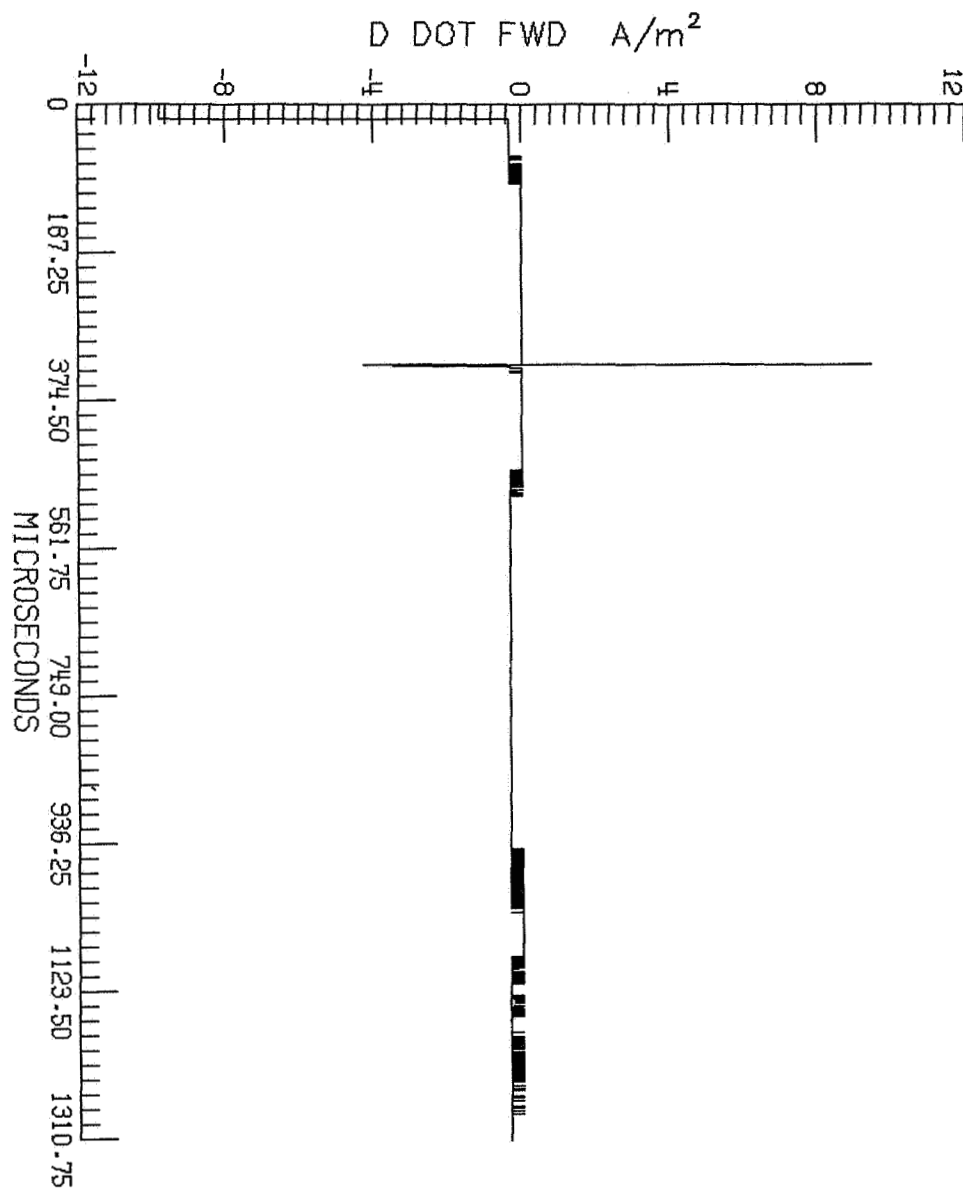


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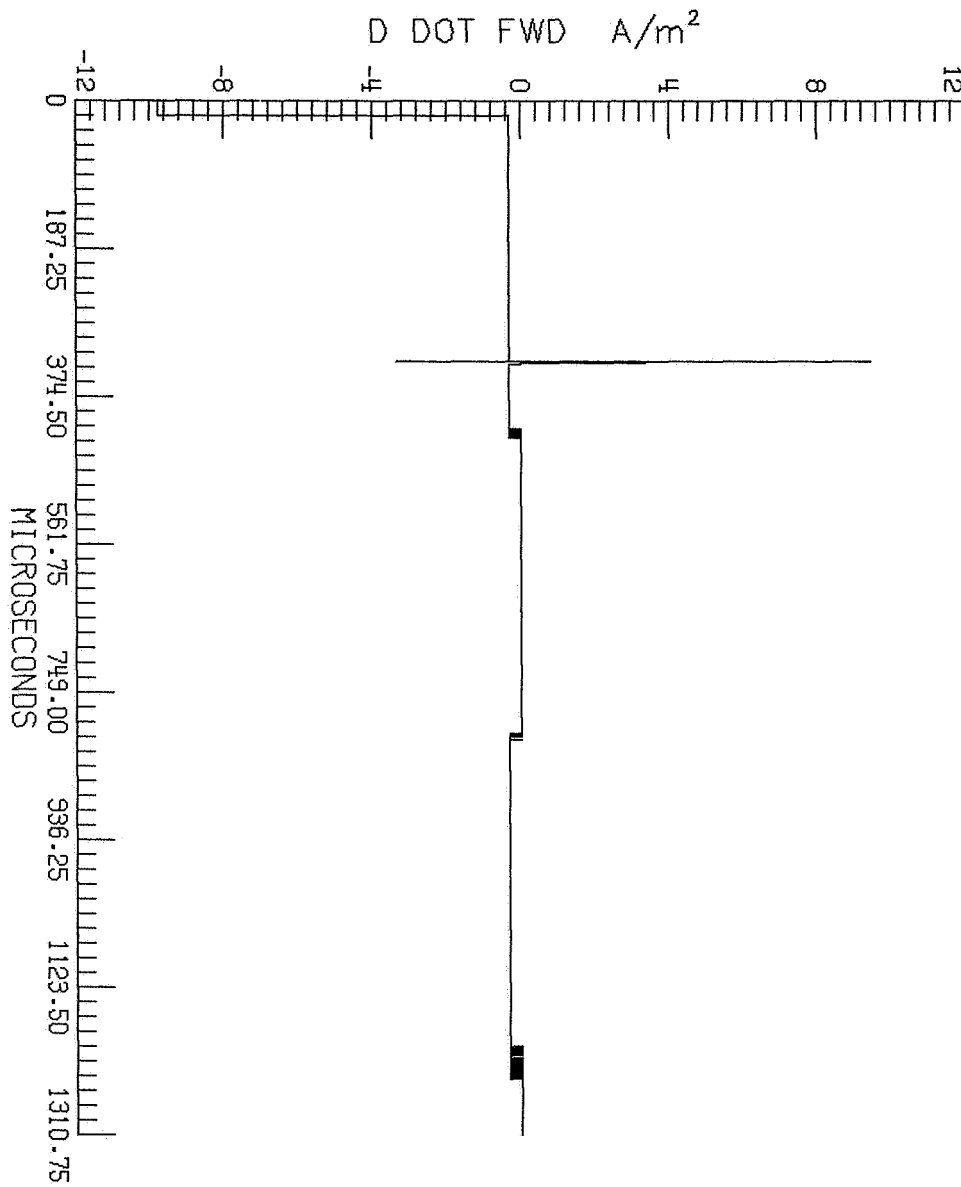


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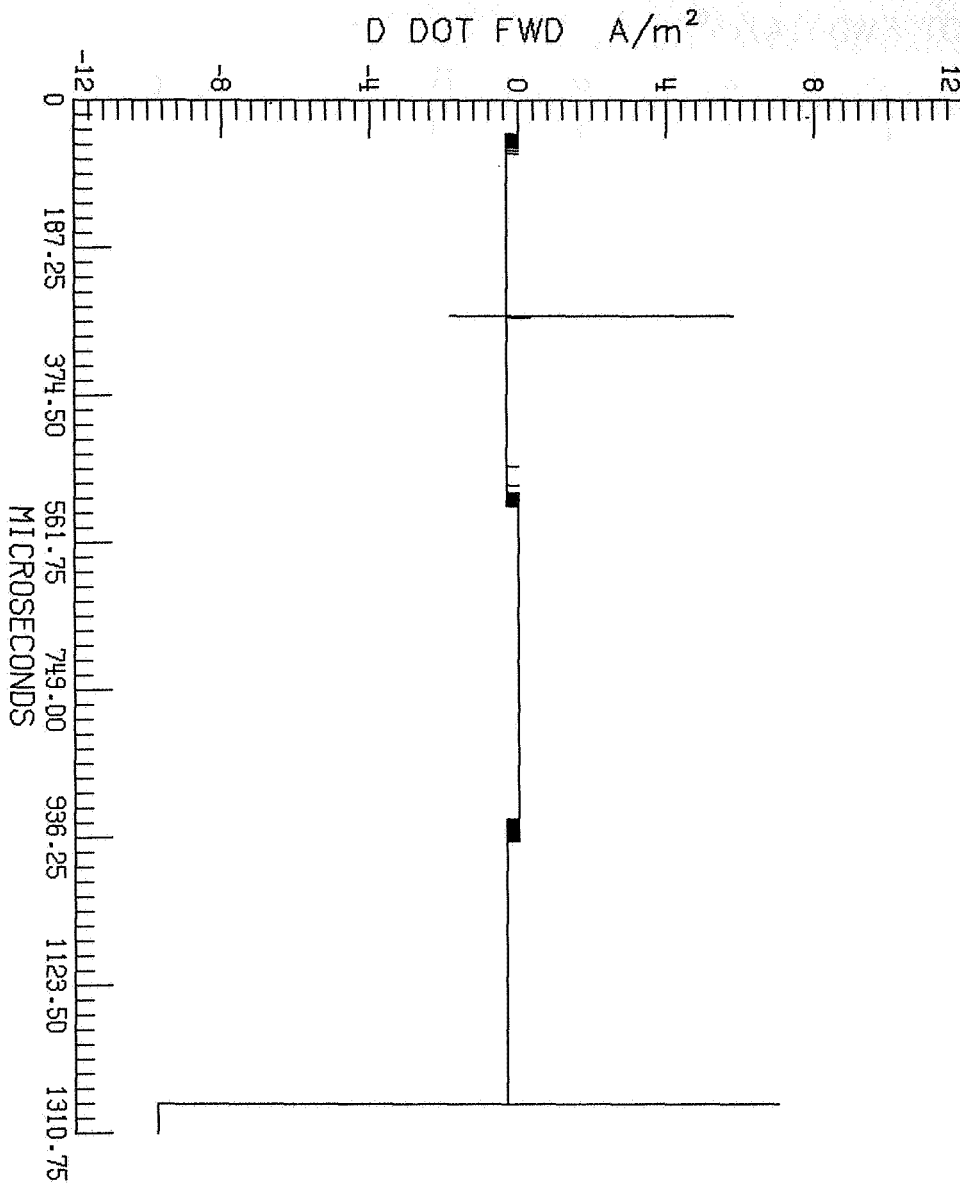


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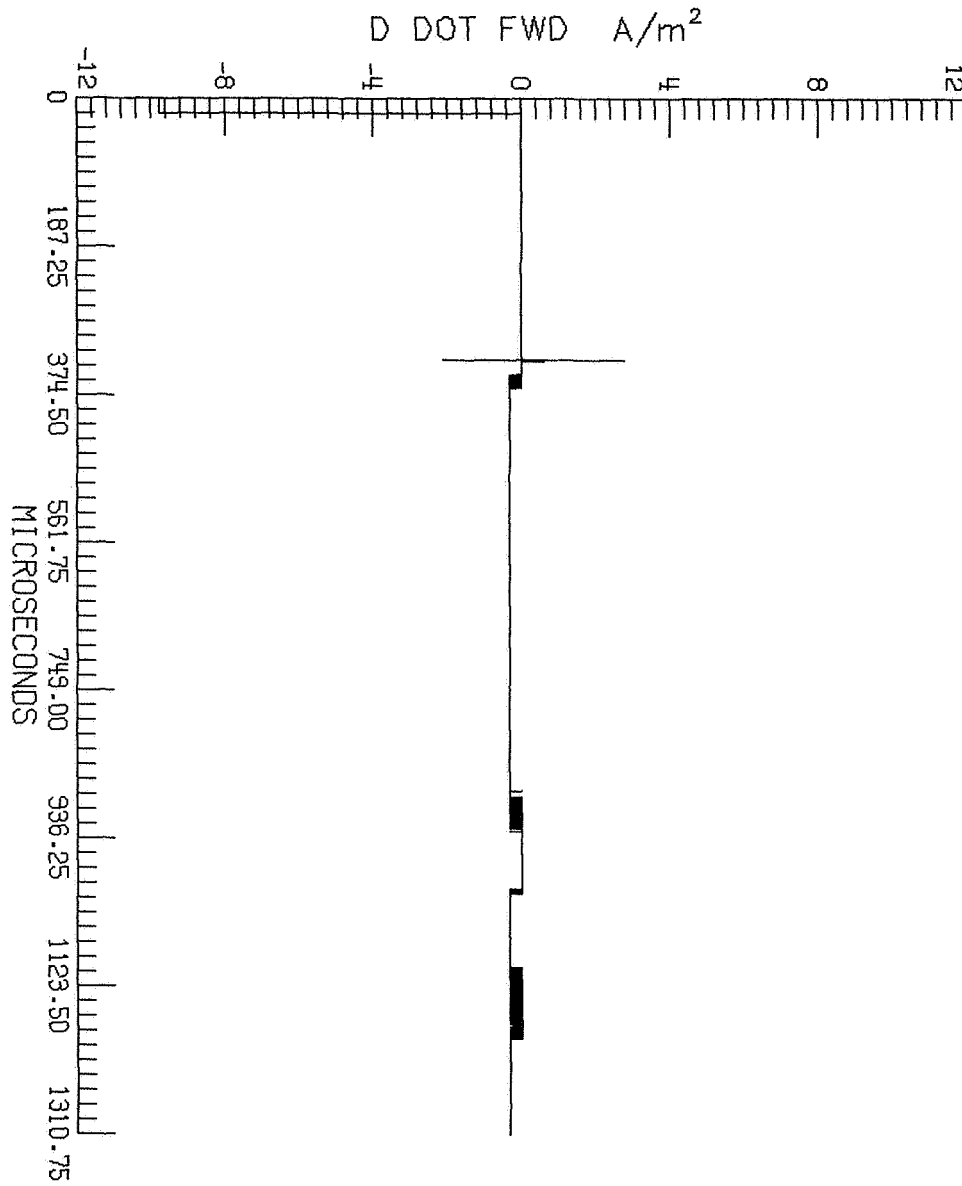


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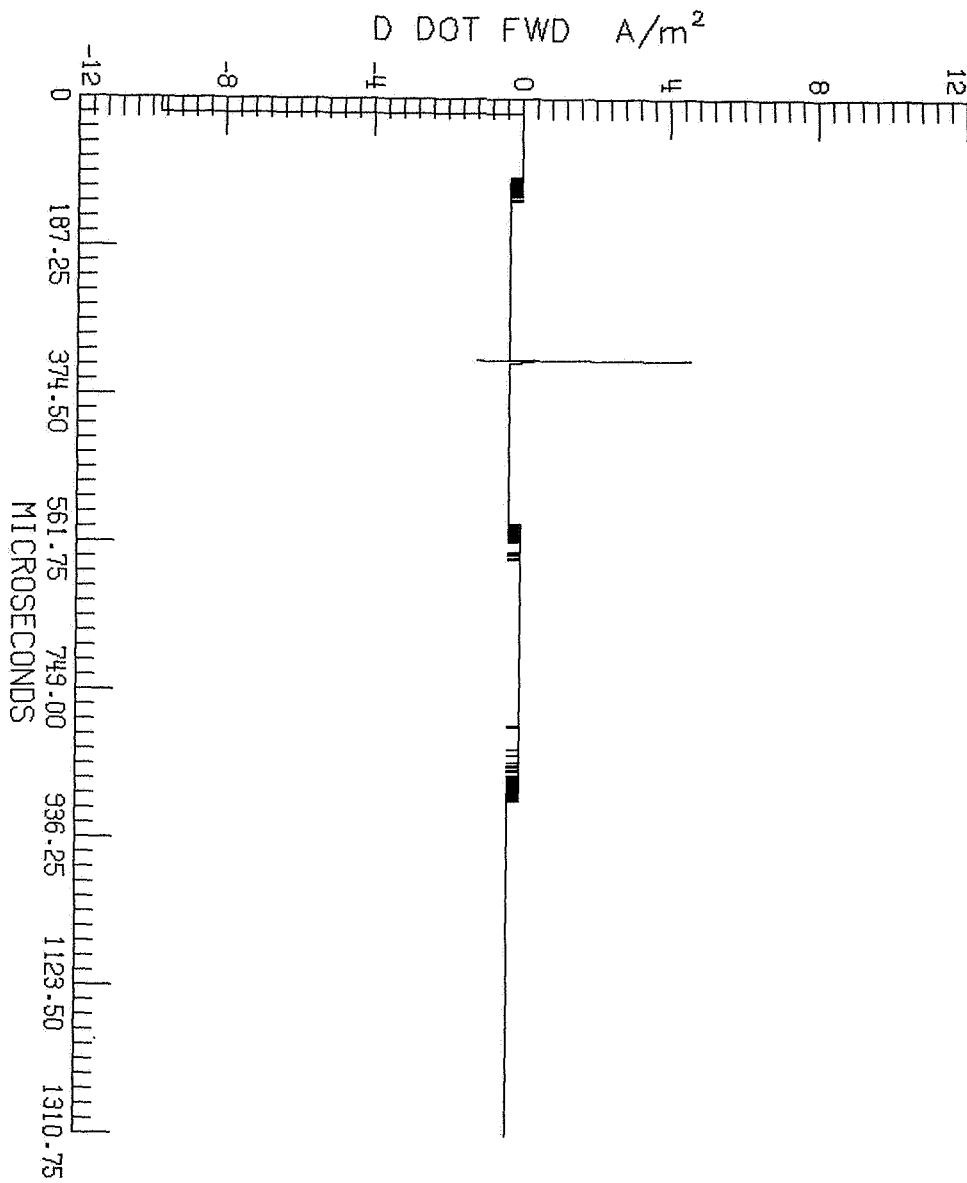


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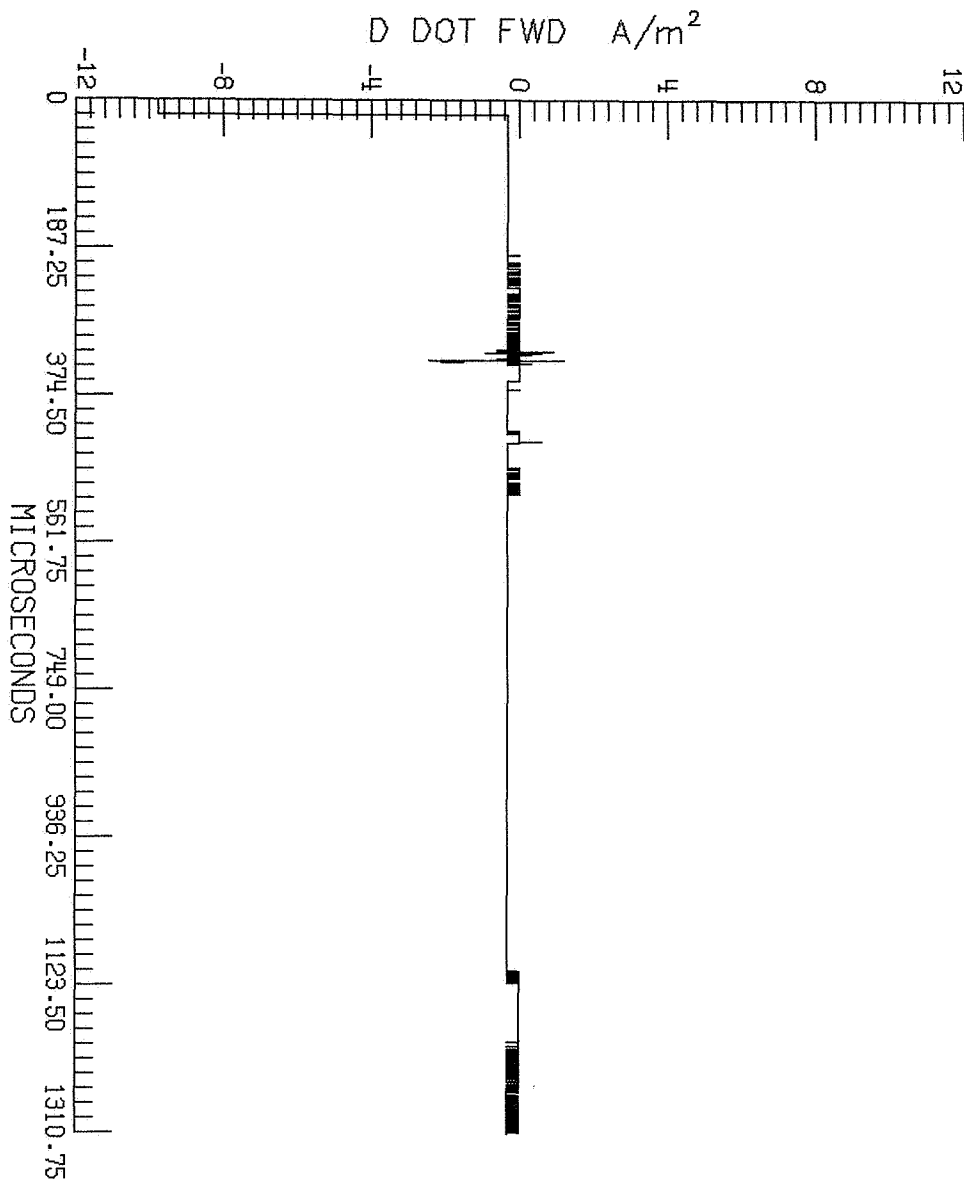
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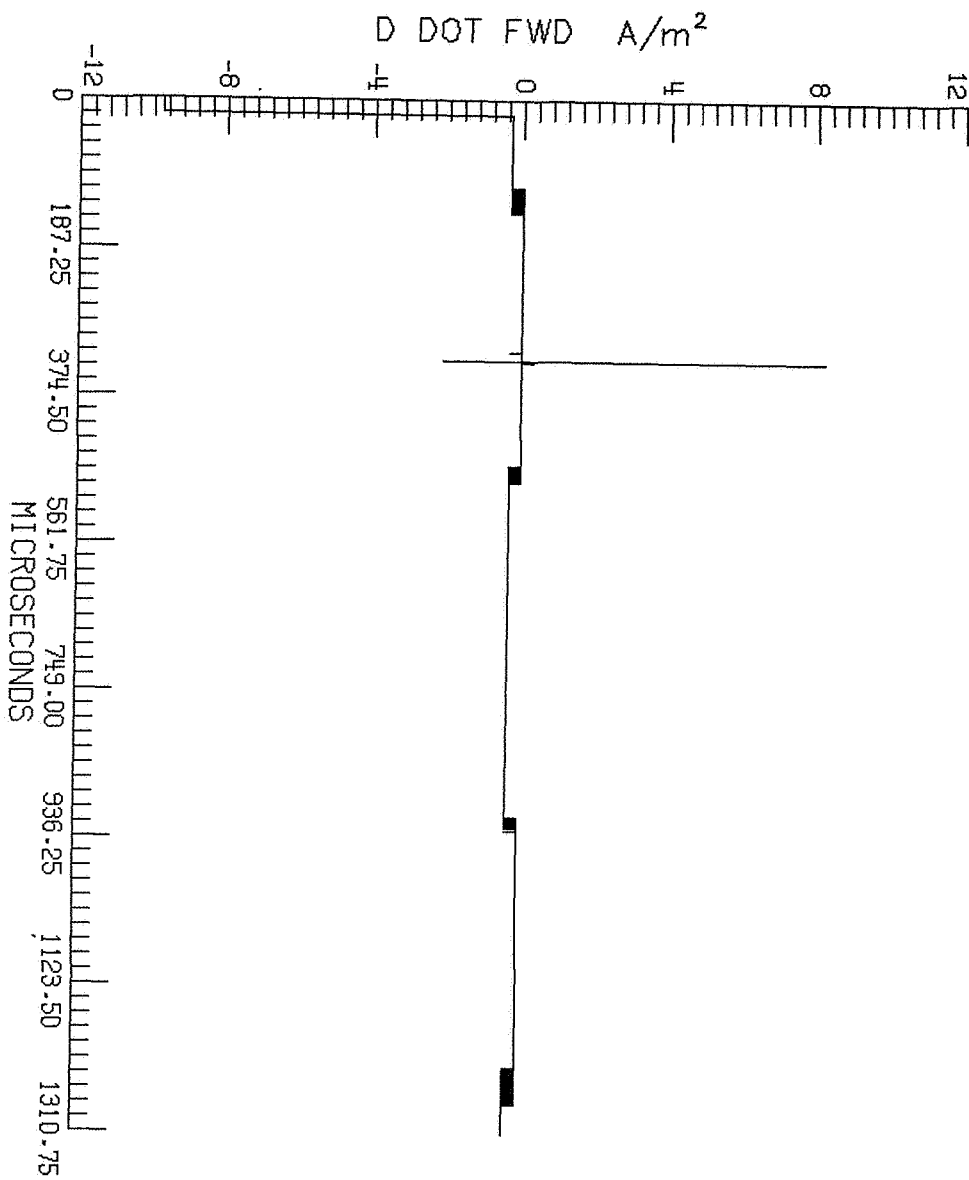


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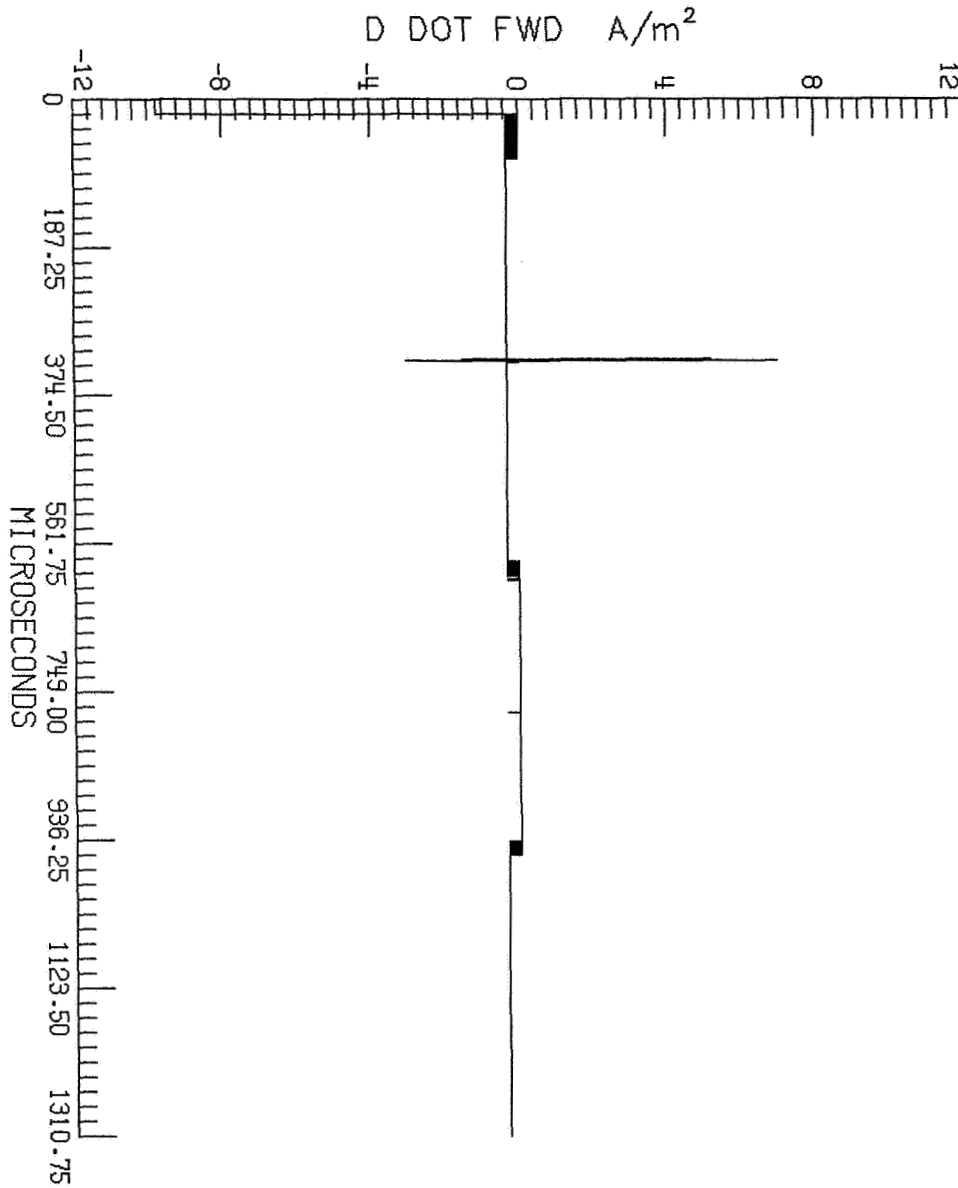


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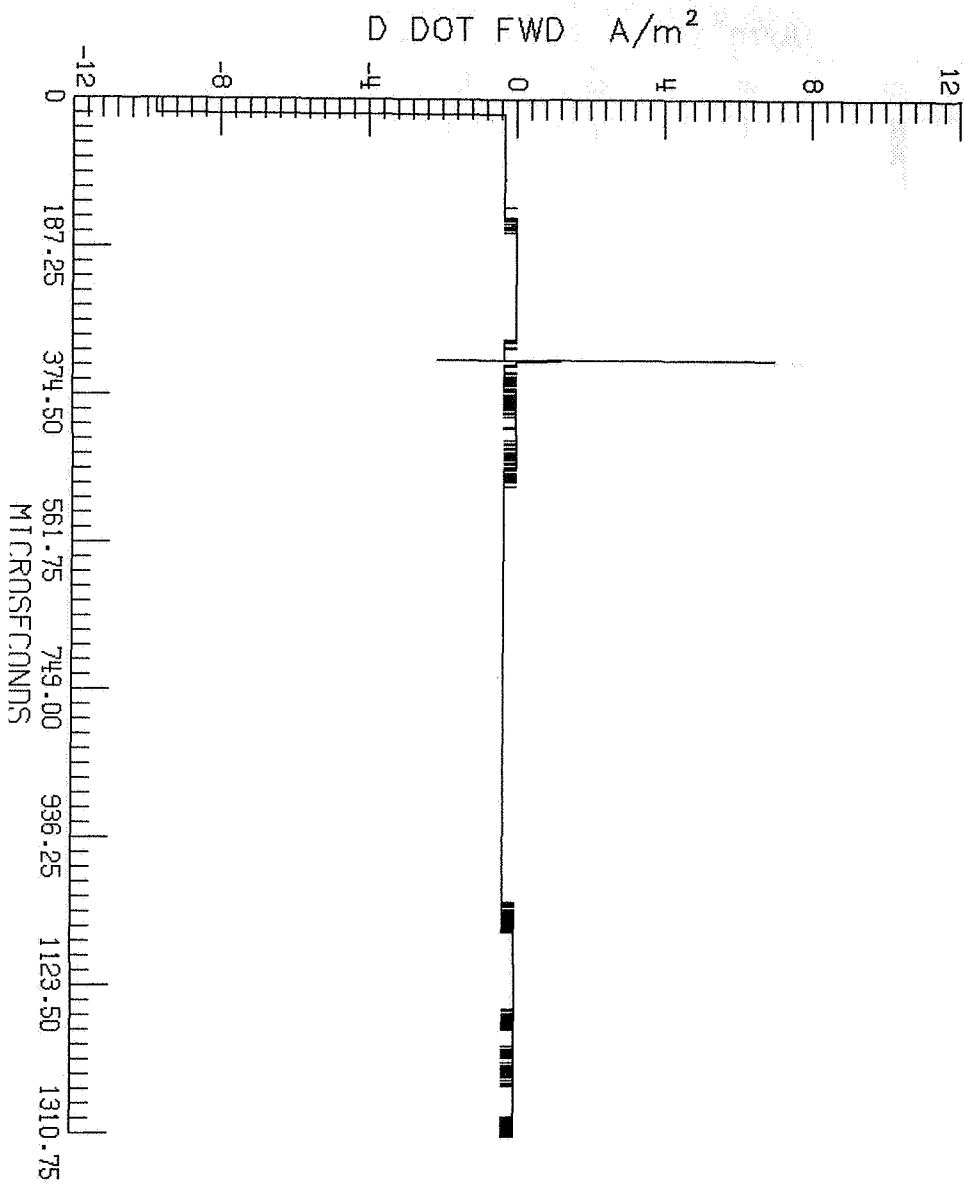


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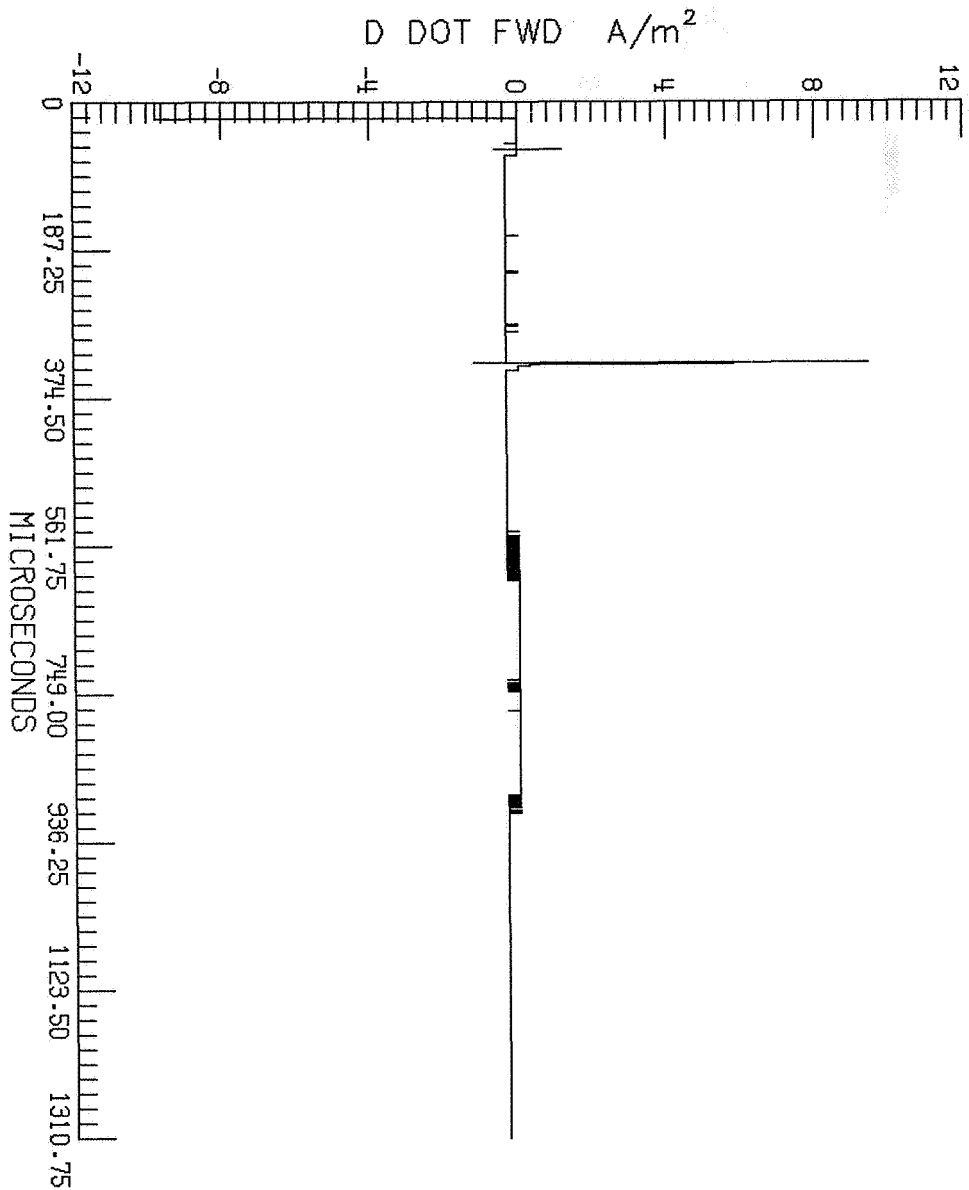
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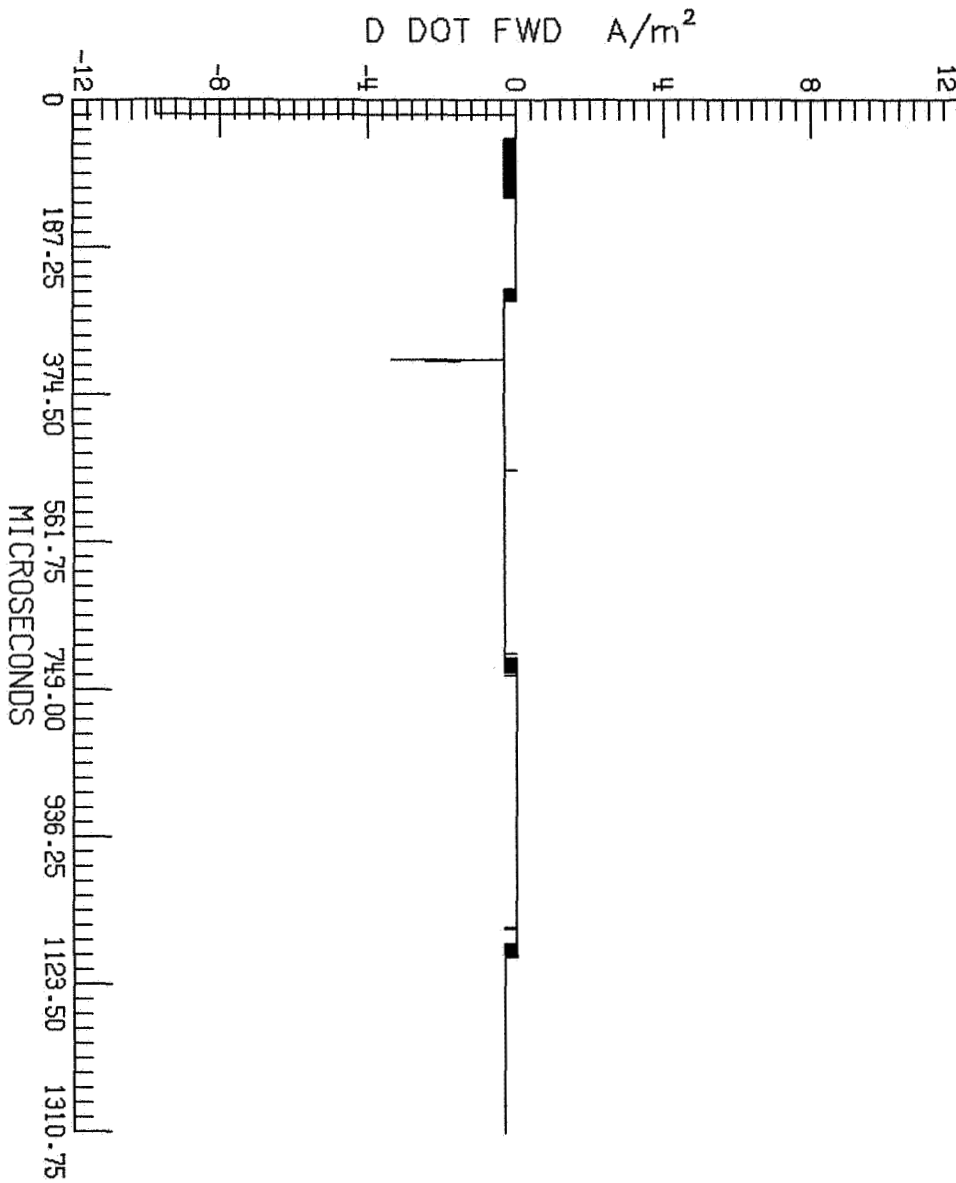


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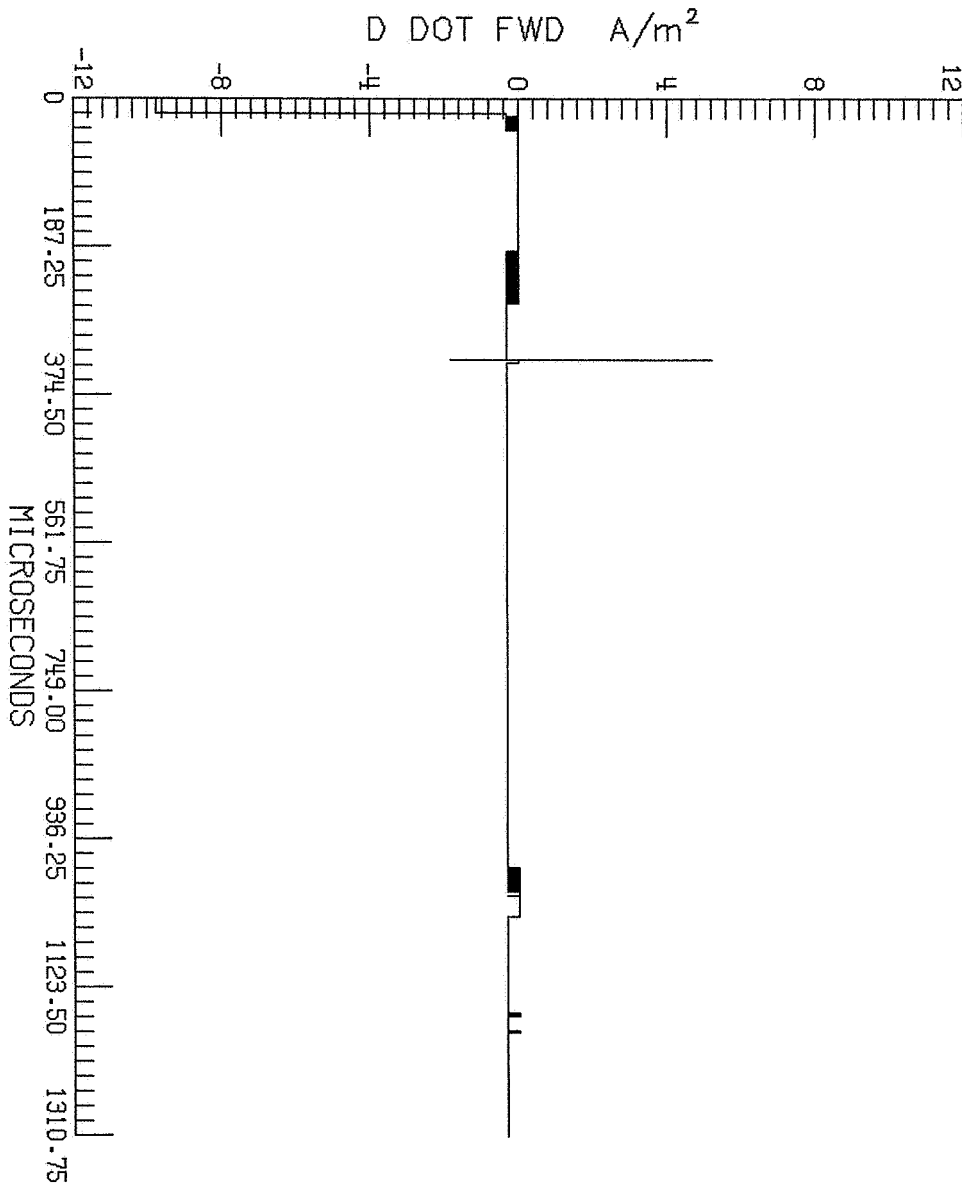
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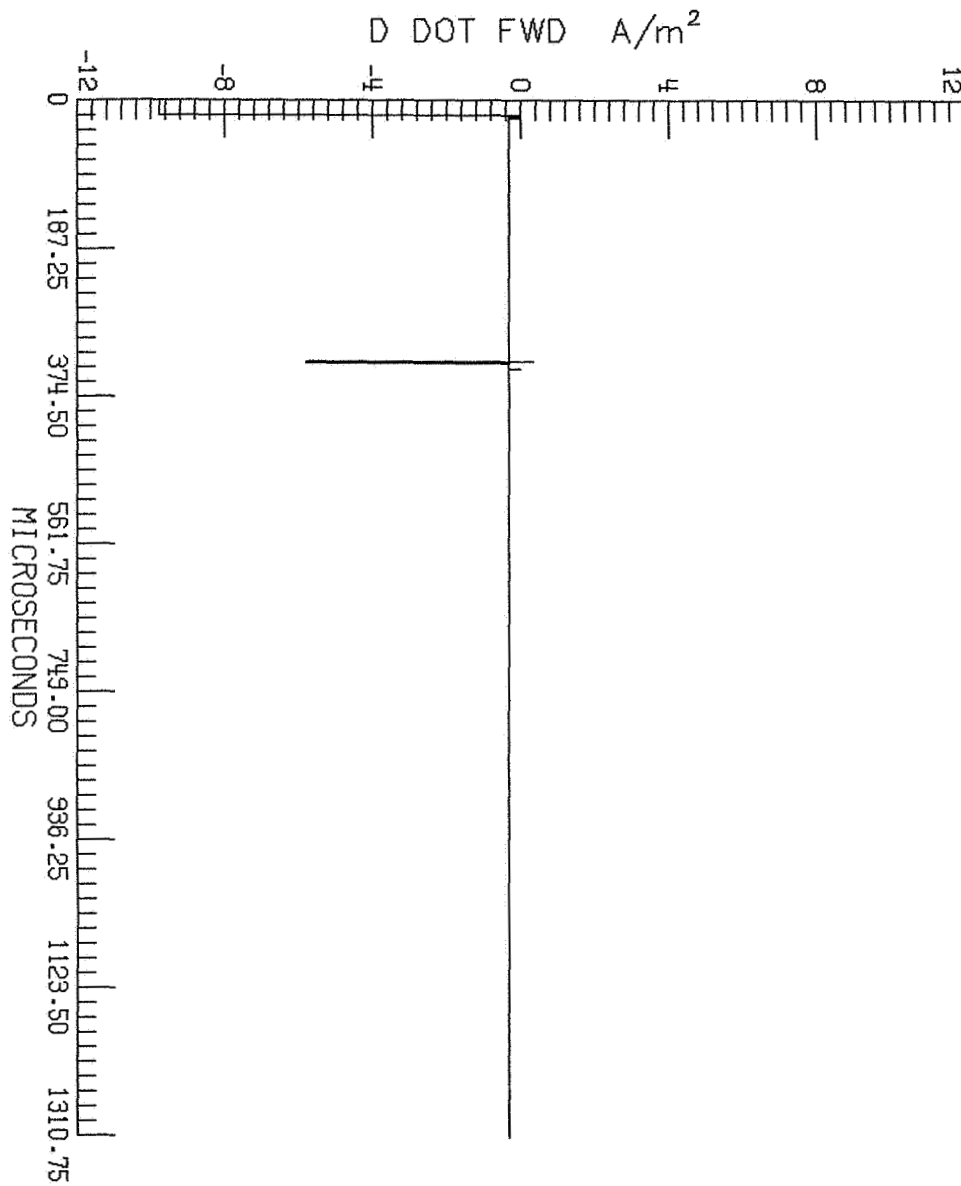


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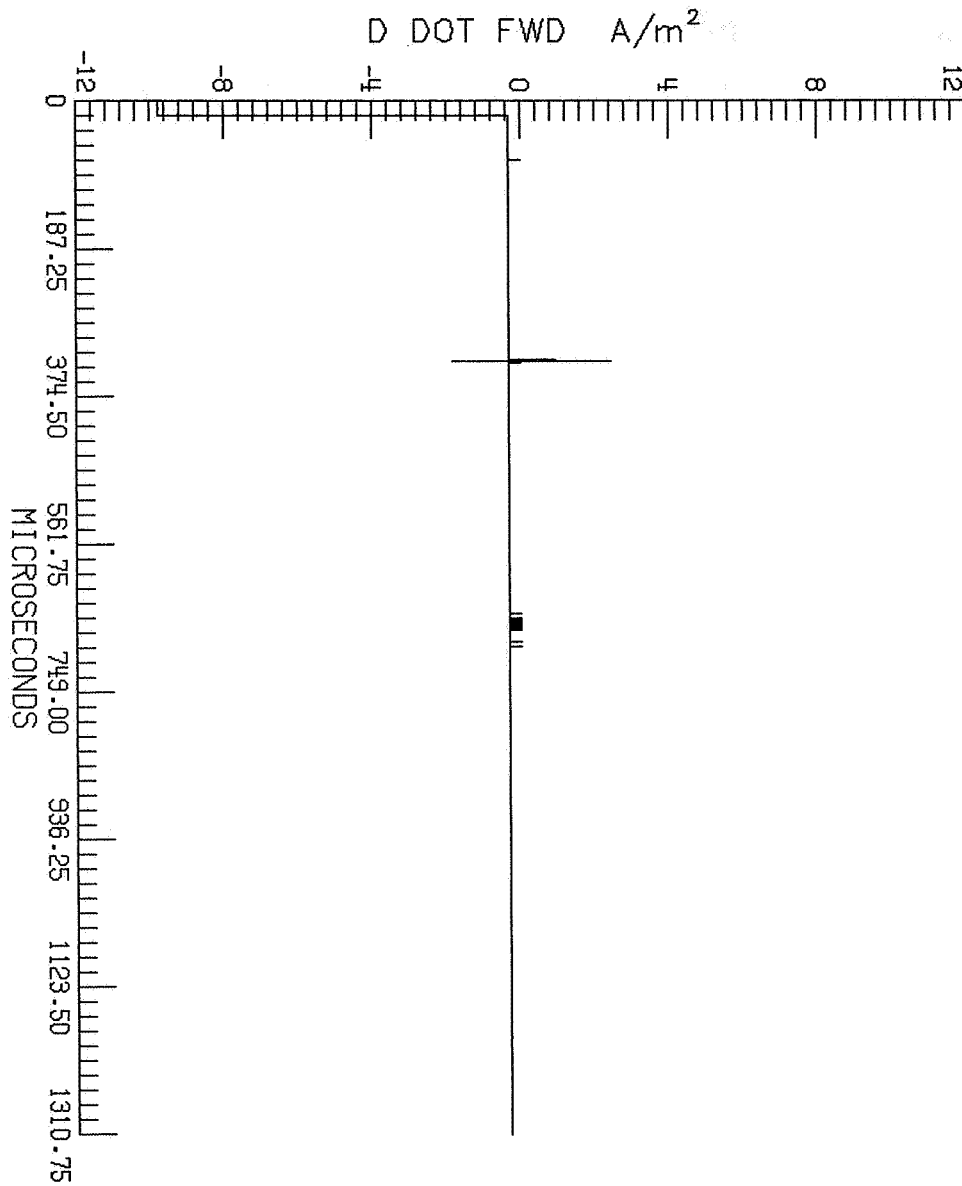
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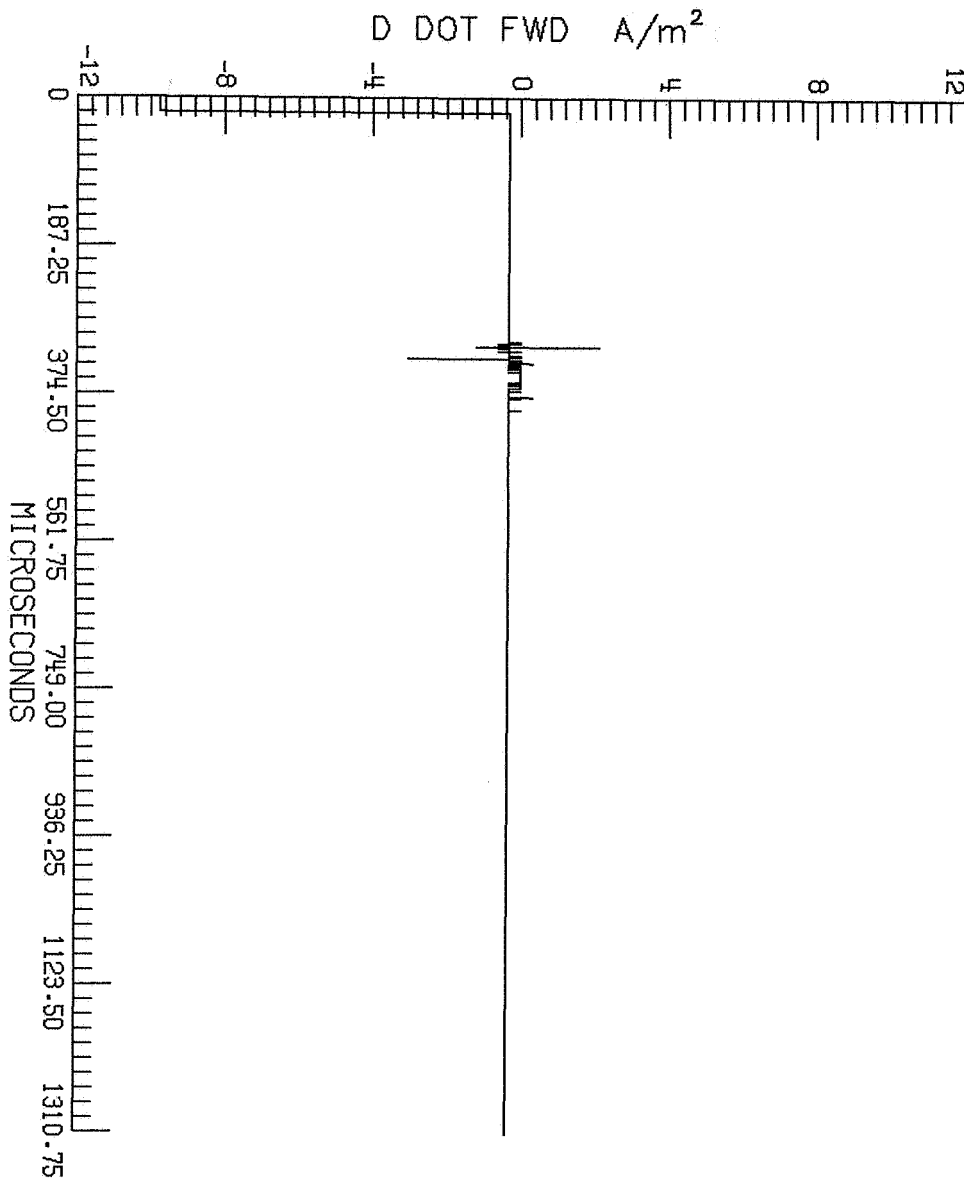
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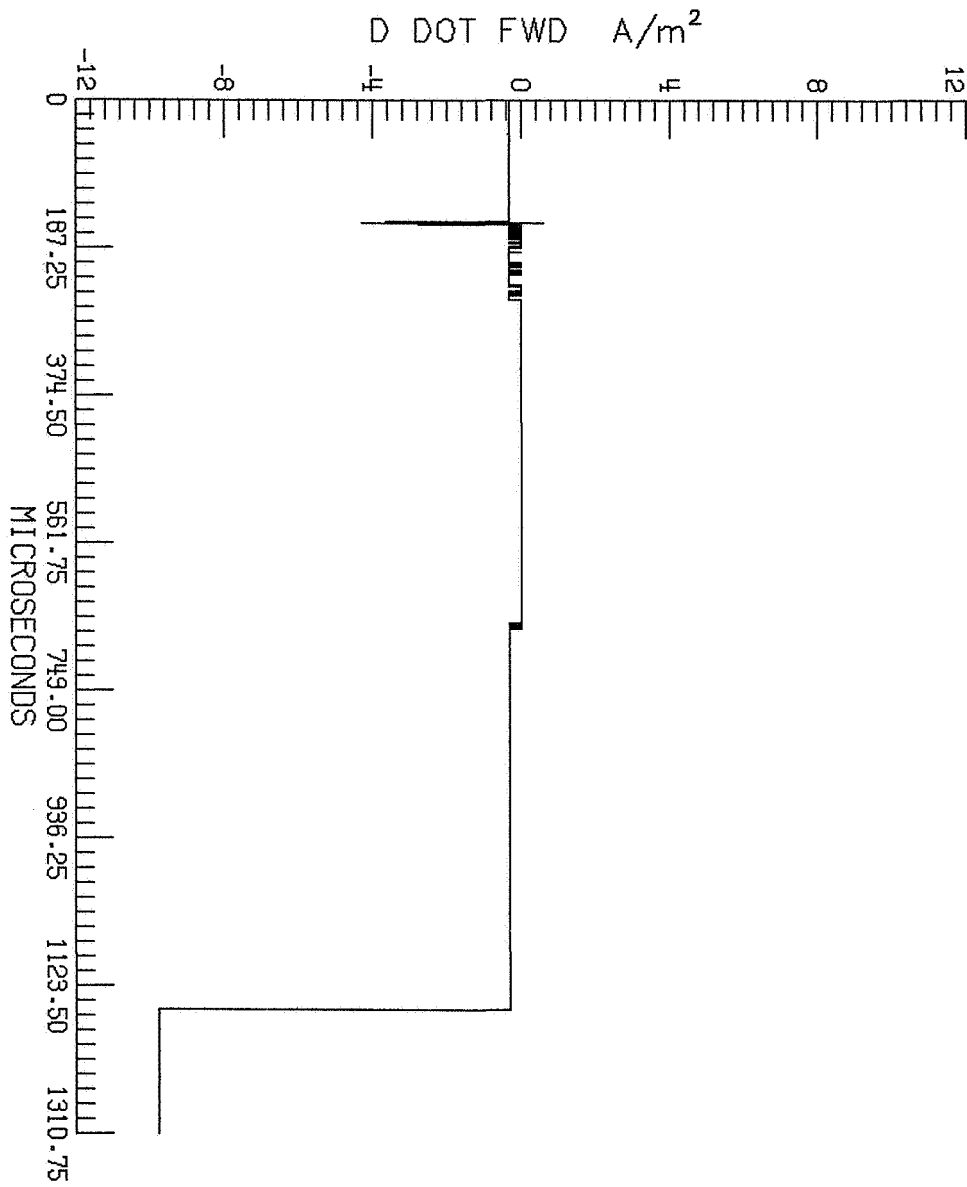
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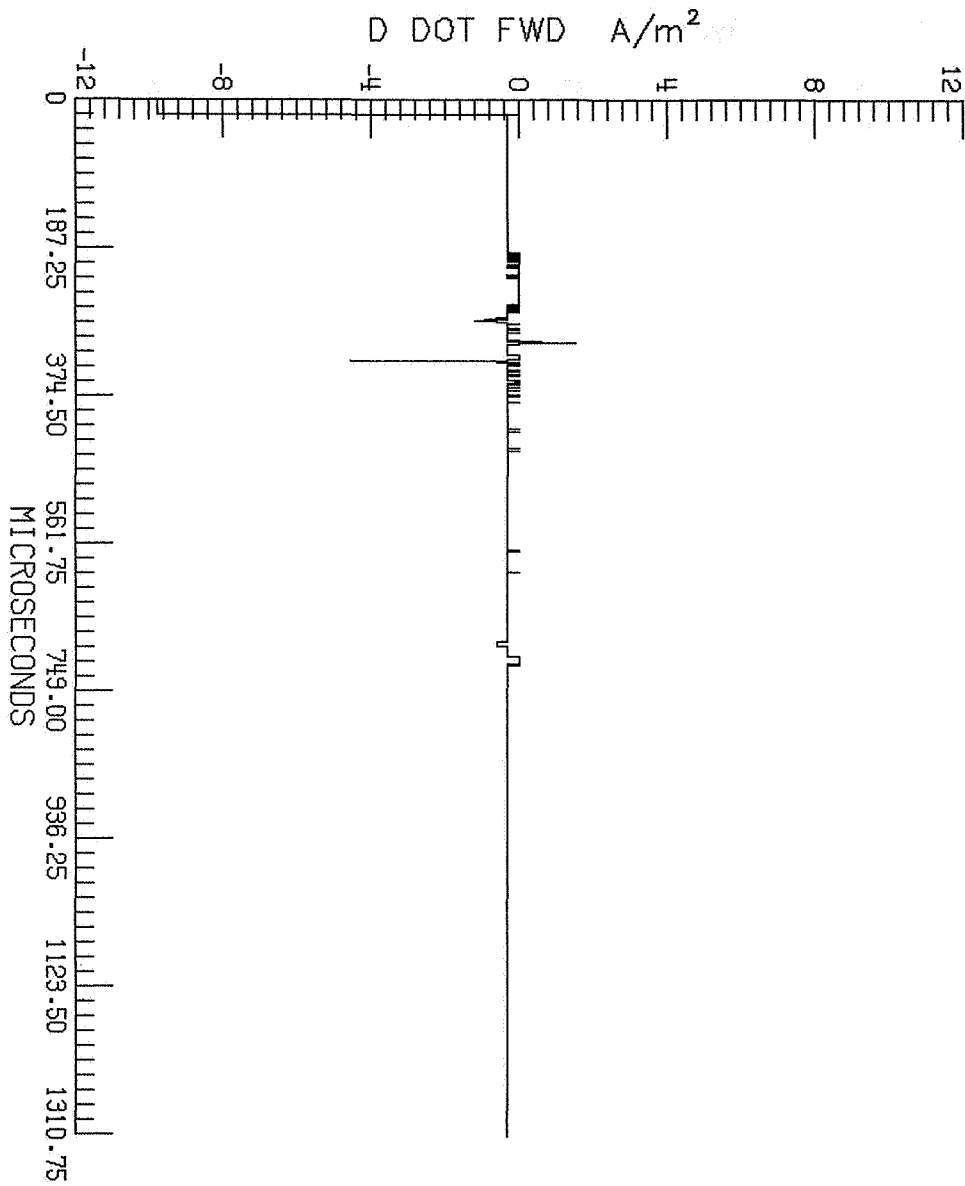
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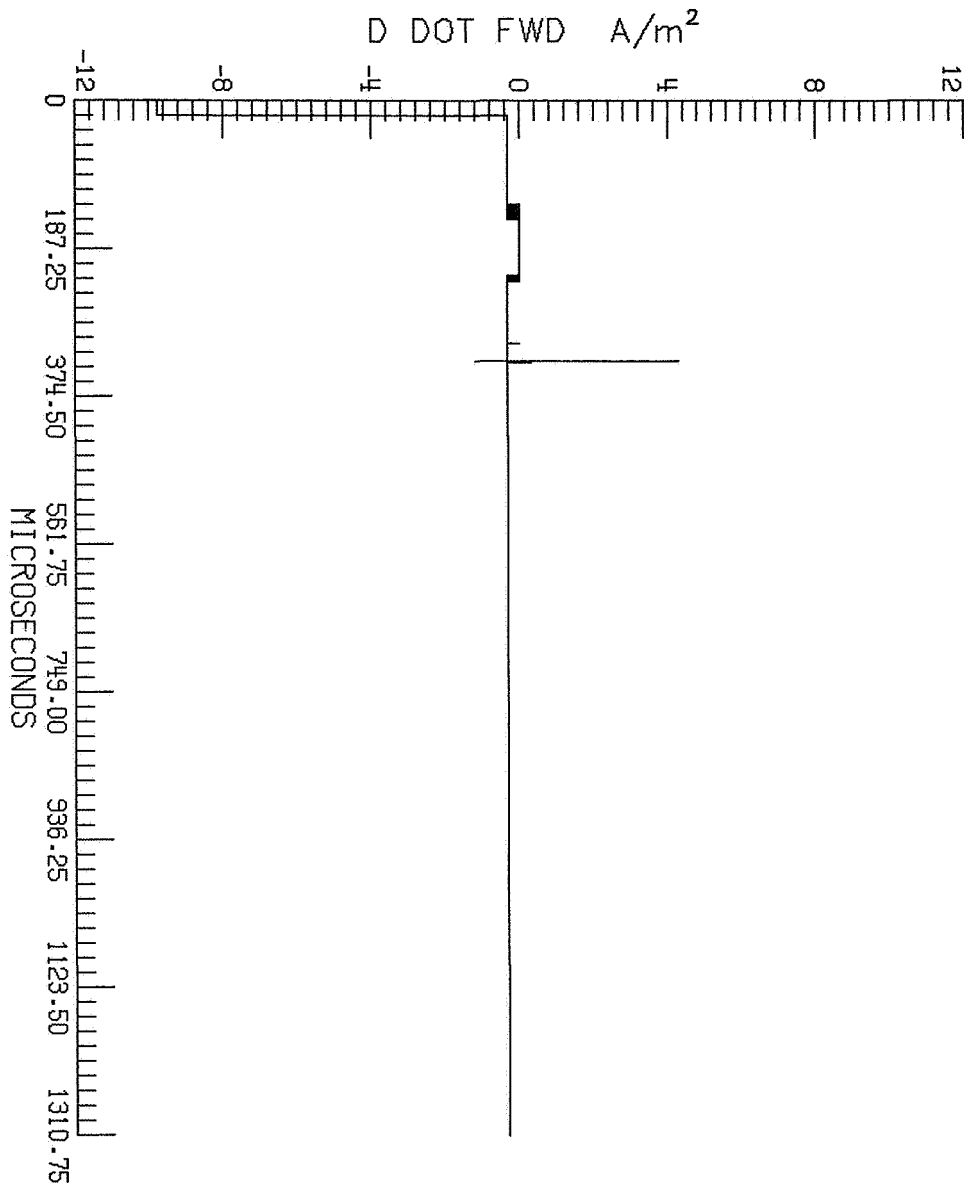
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F106 LIGHTNING/TK10/PCM/M.THOMAS

TEST NO. 82-027

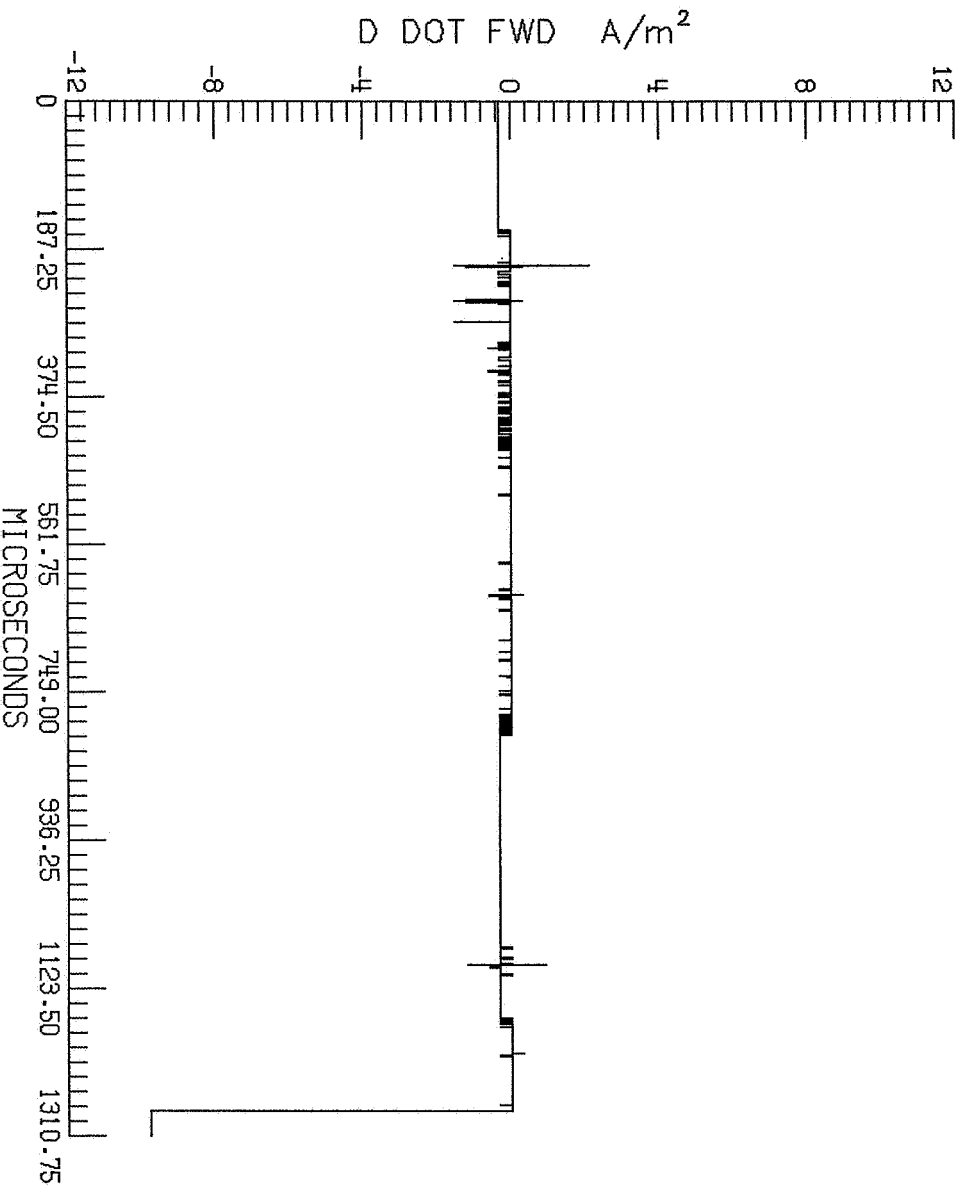
RUN NO. 3



F106 LIGHTNING/TK10/PCM/M.THOMAS

TEST NO. 82-028

RUN NO. 1

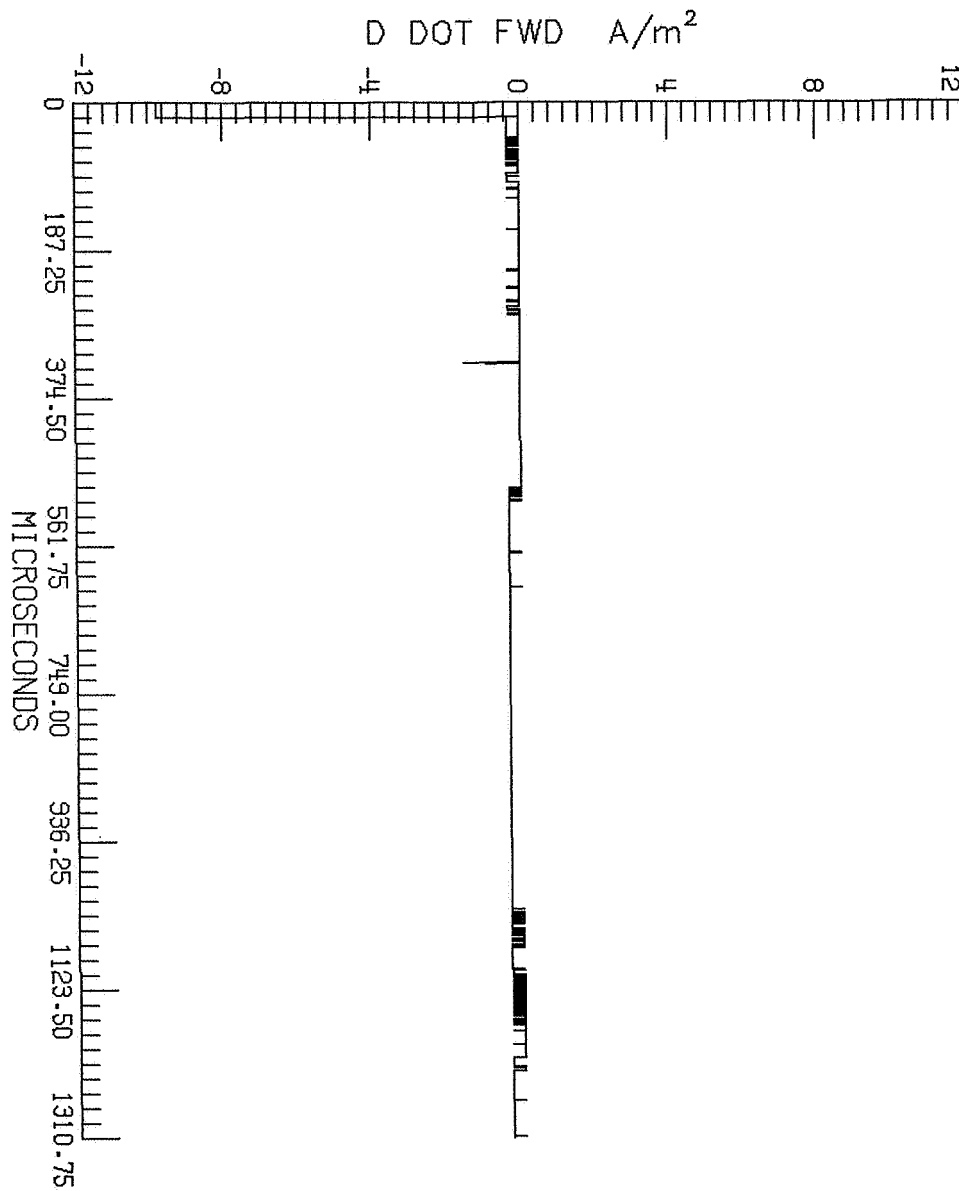


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TEST NO. 82-028

RUN NO. 2

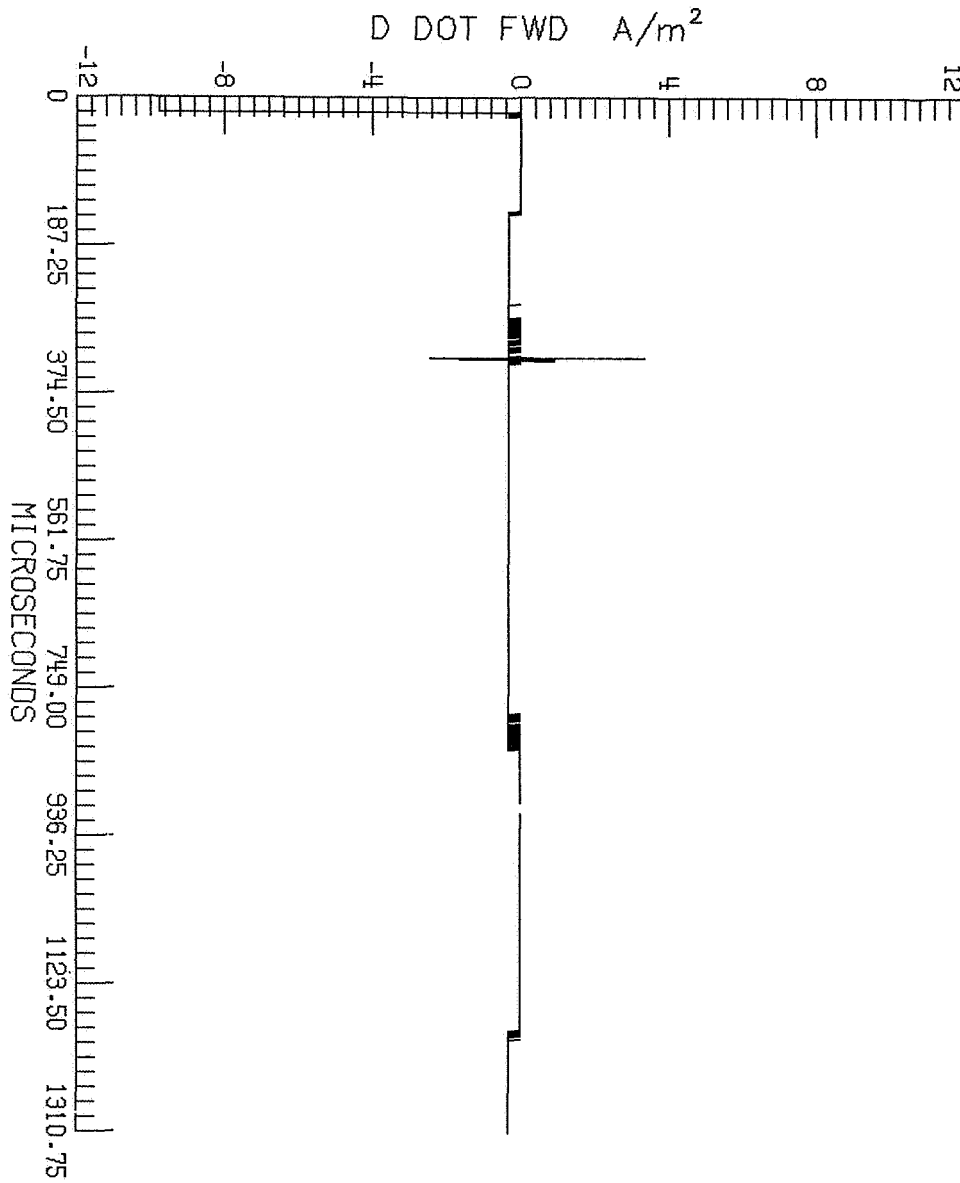


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TEST NO. 82-028

RUN NO. 3

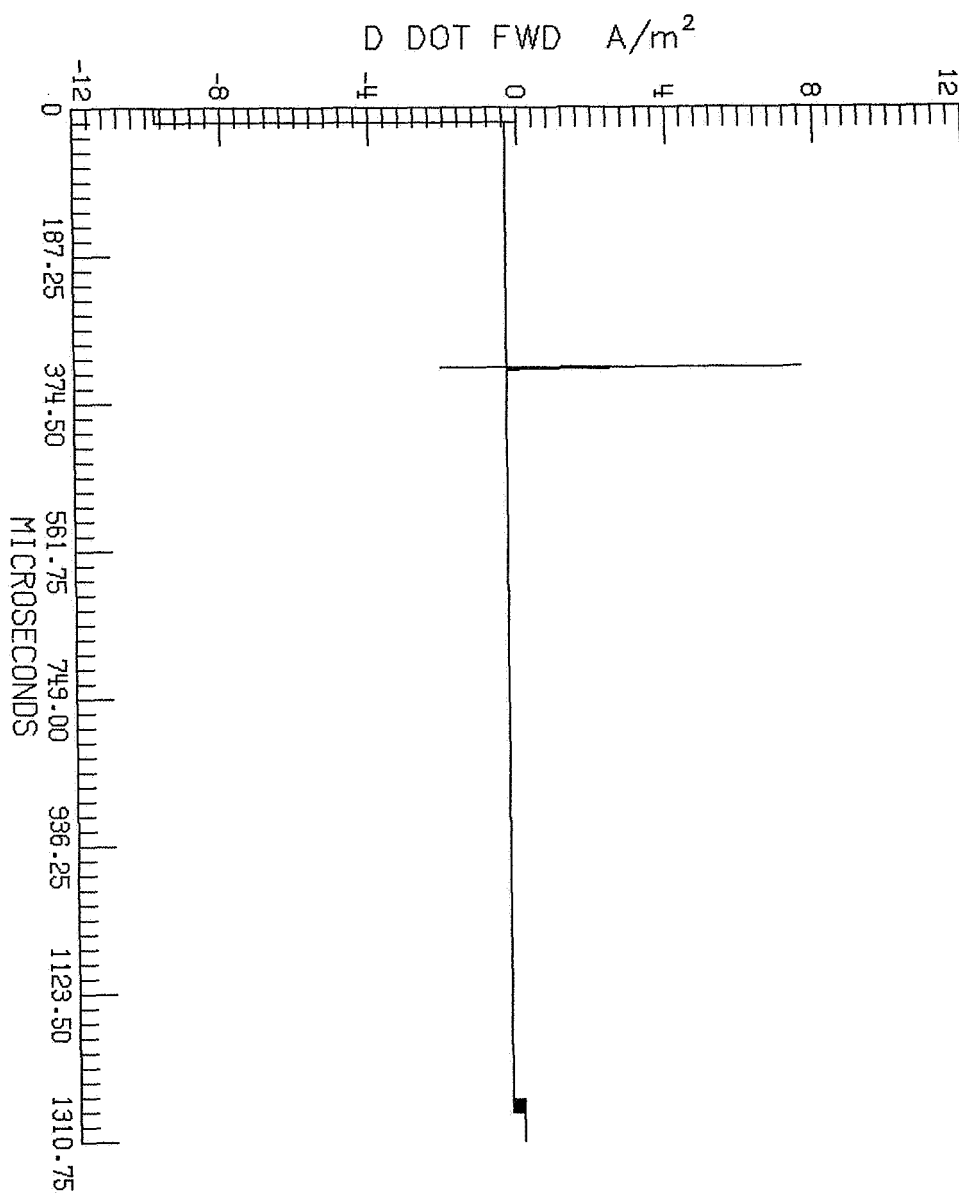


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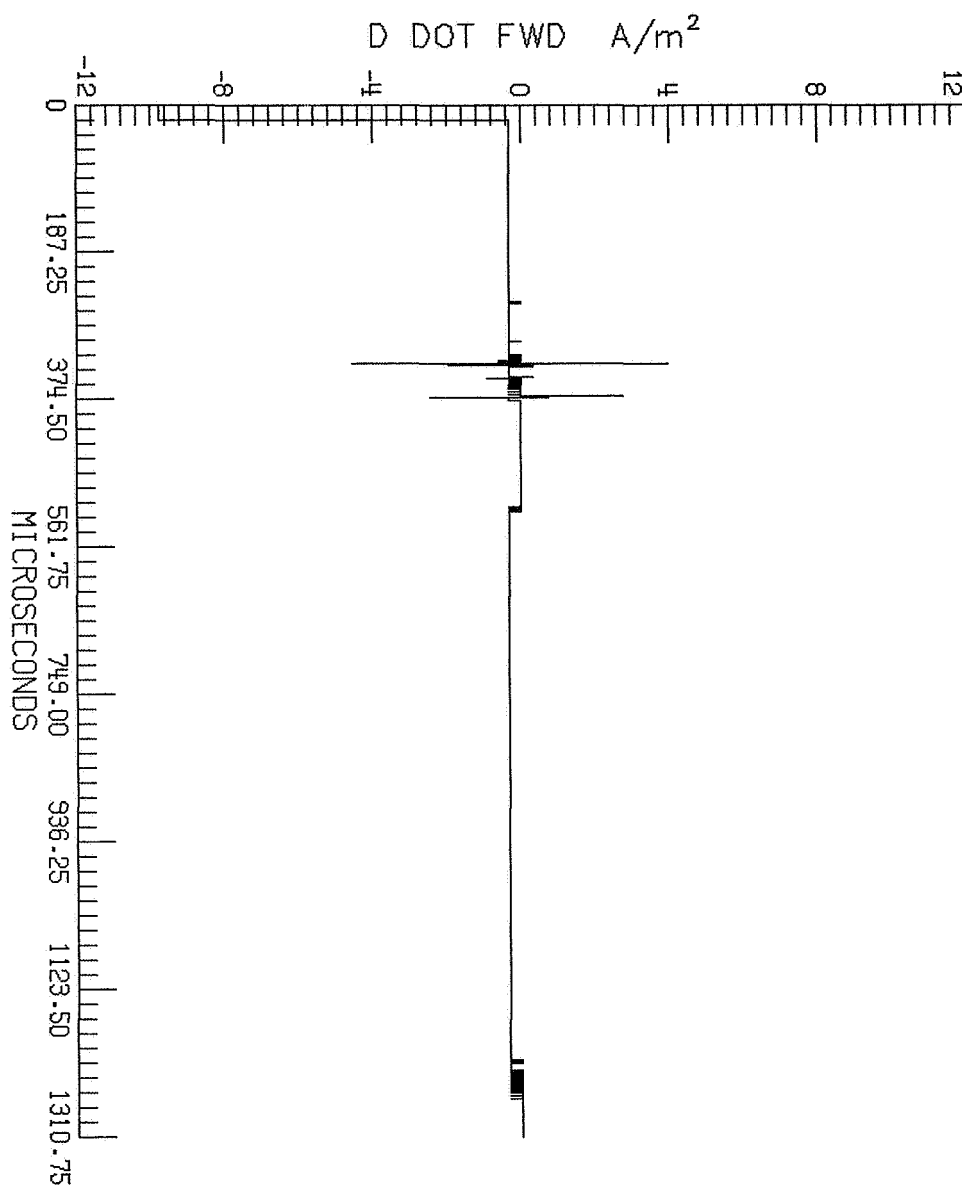
RUN NO. 4



F106 LIGHTNING/TK10/PCM/M.THOMAS

TEST NO. 82-028

RUN NO. 5

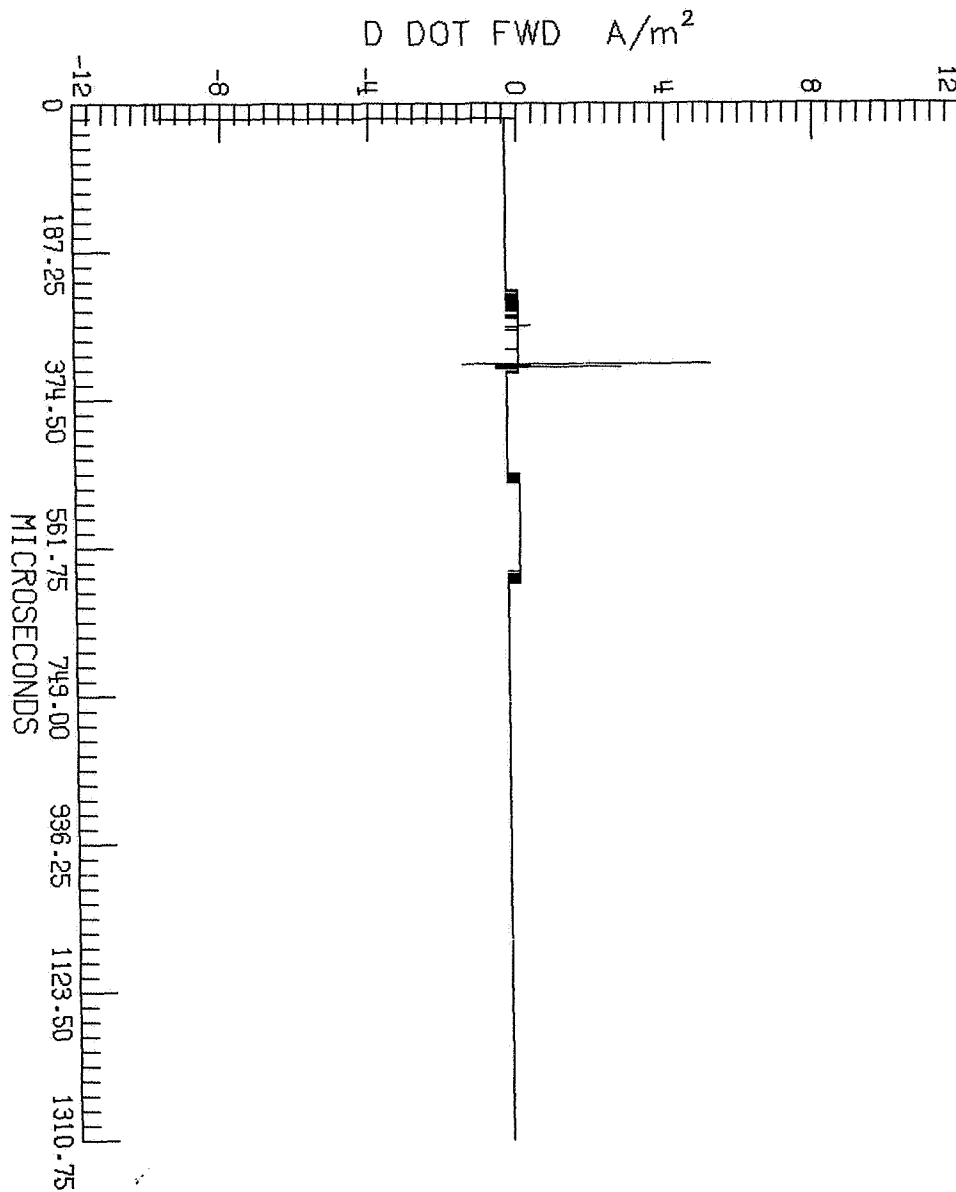


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TEST NO. 82-028

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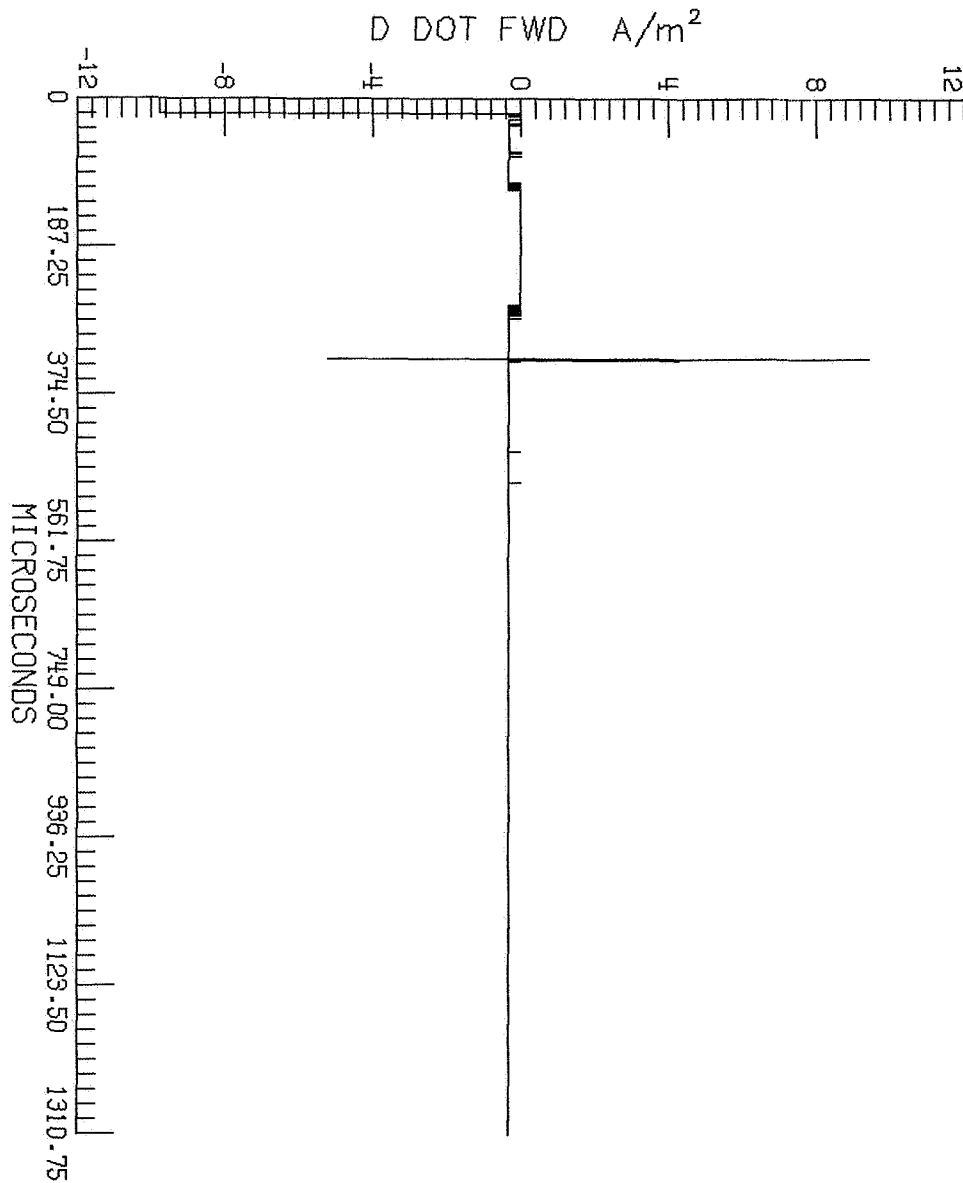


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F106 LIGHTNING/TK10/PCM/M.THOMAS

TEST NO. 82-028

RUN NO. 7

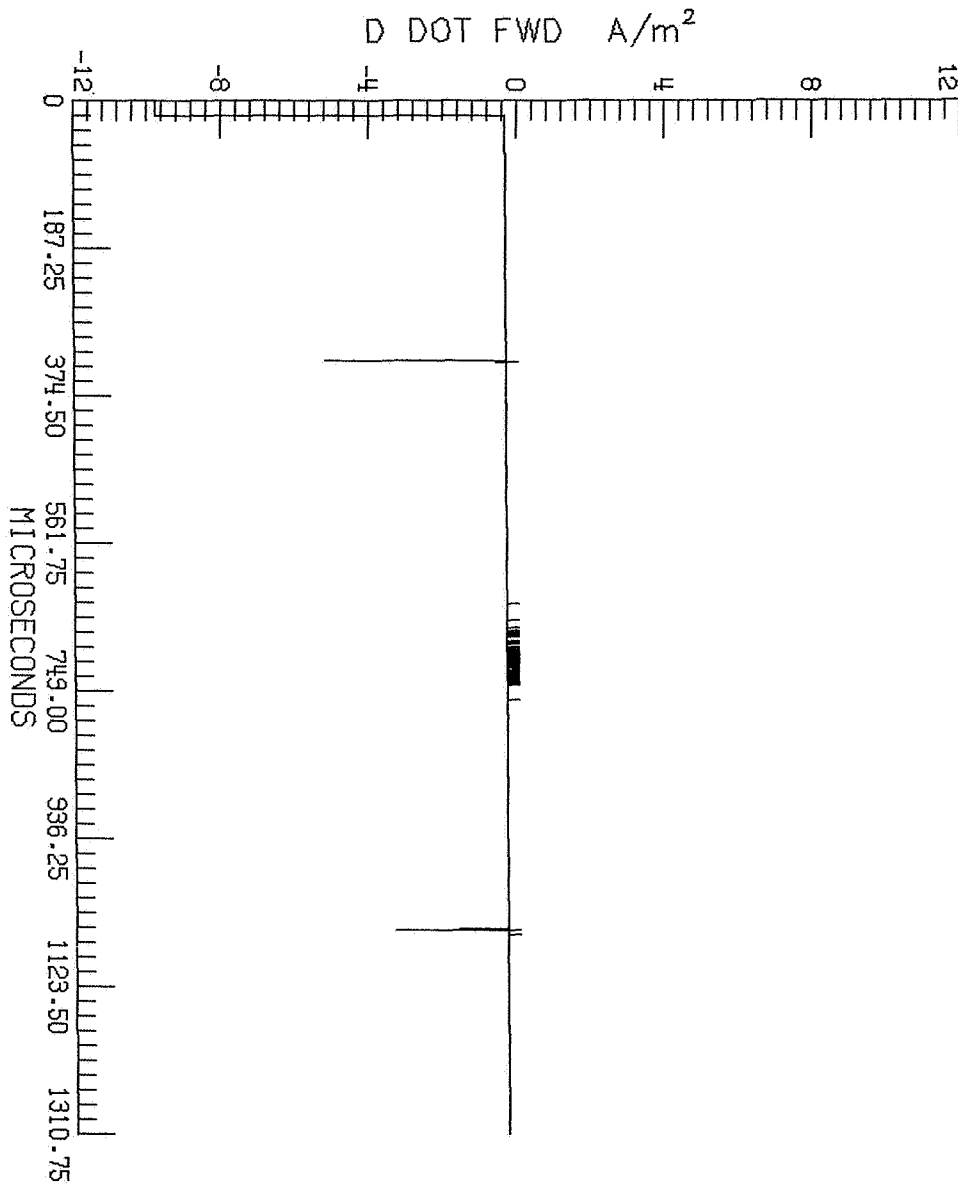


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TEST NO. 82-028

RUN NO. 8

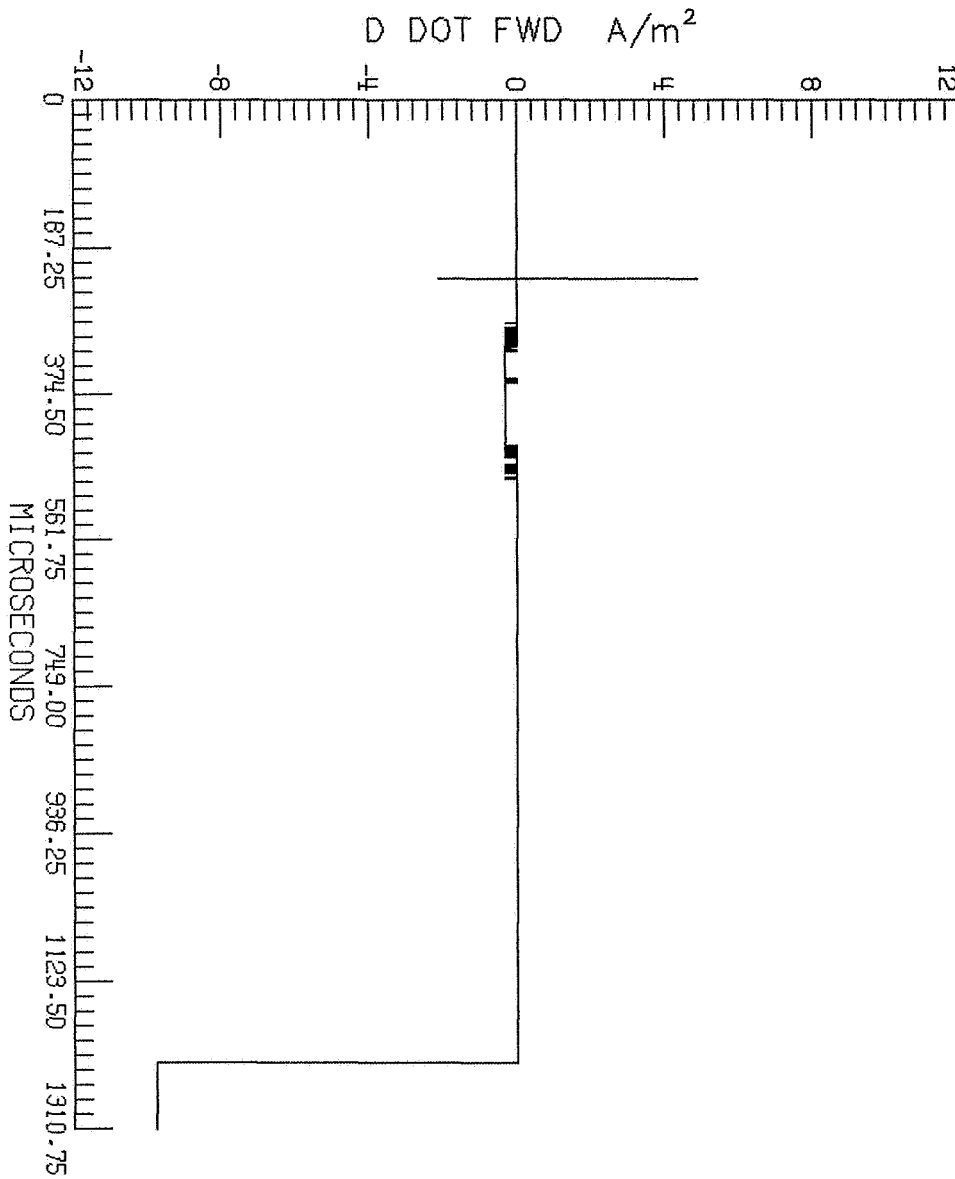


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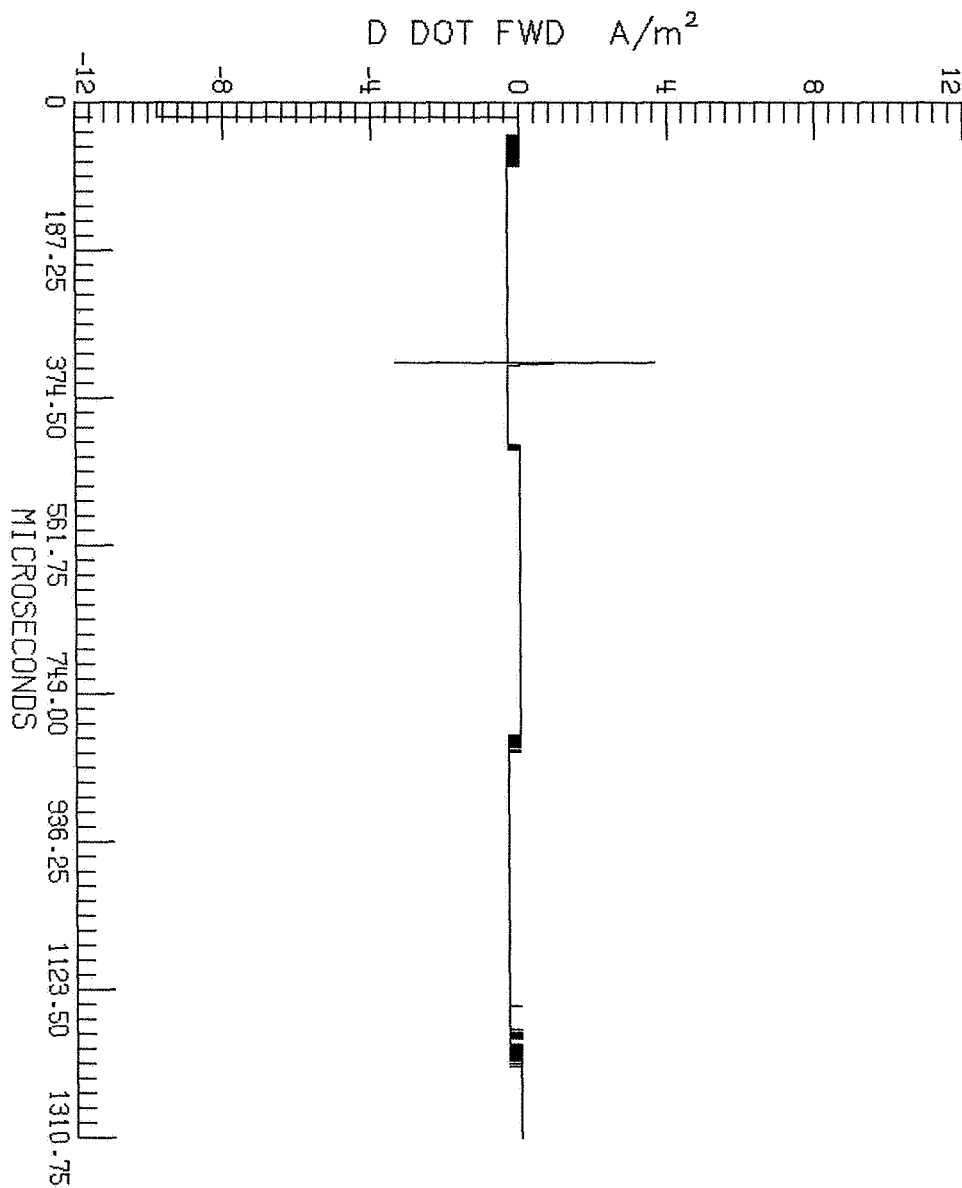


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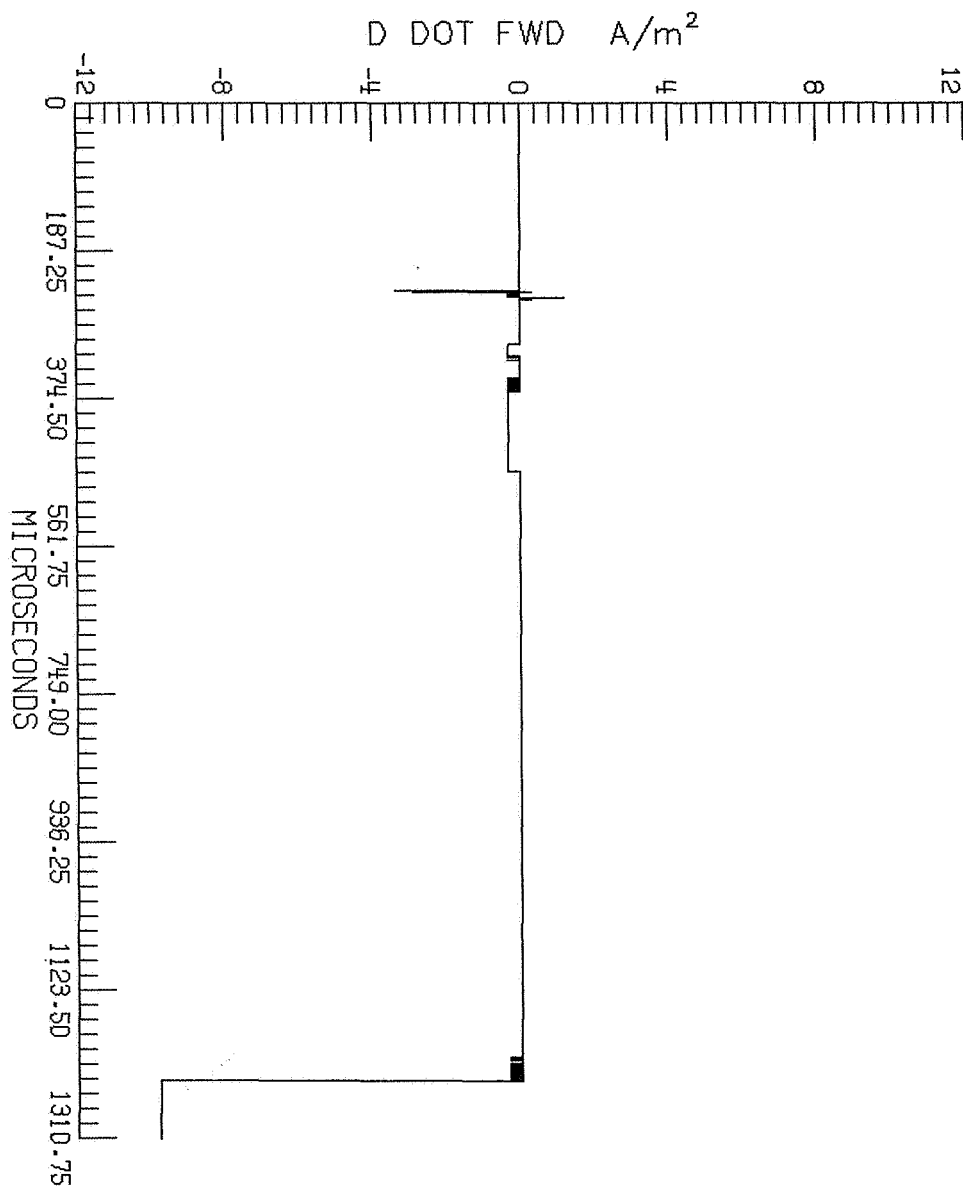


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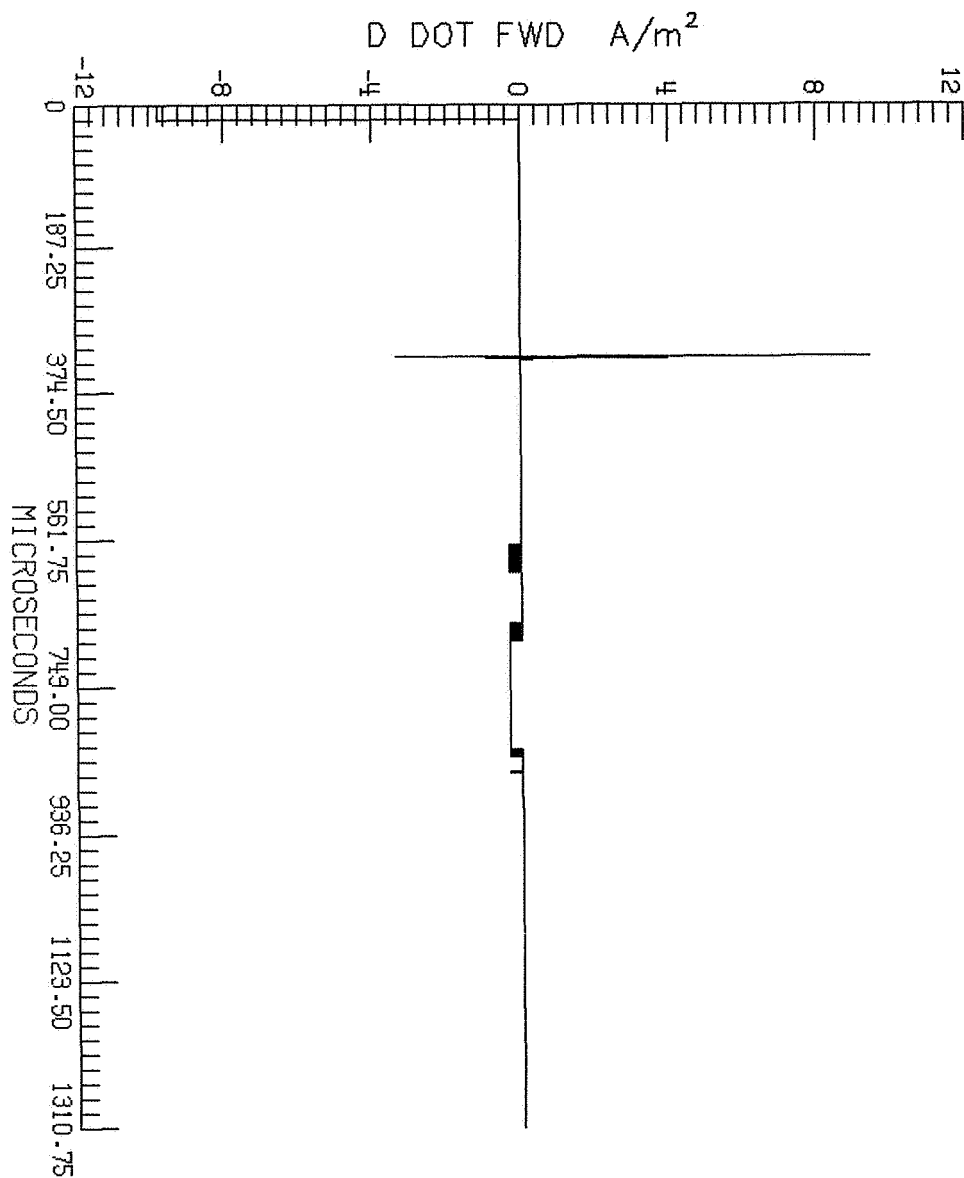
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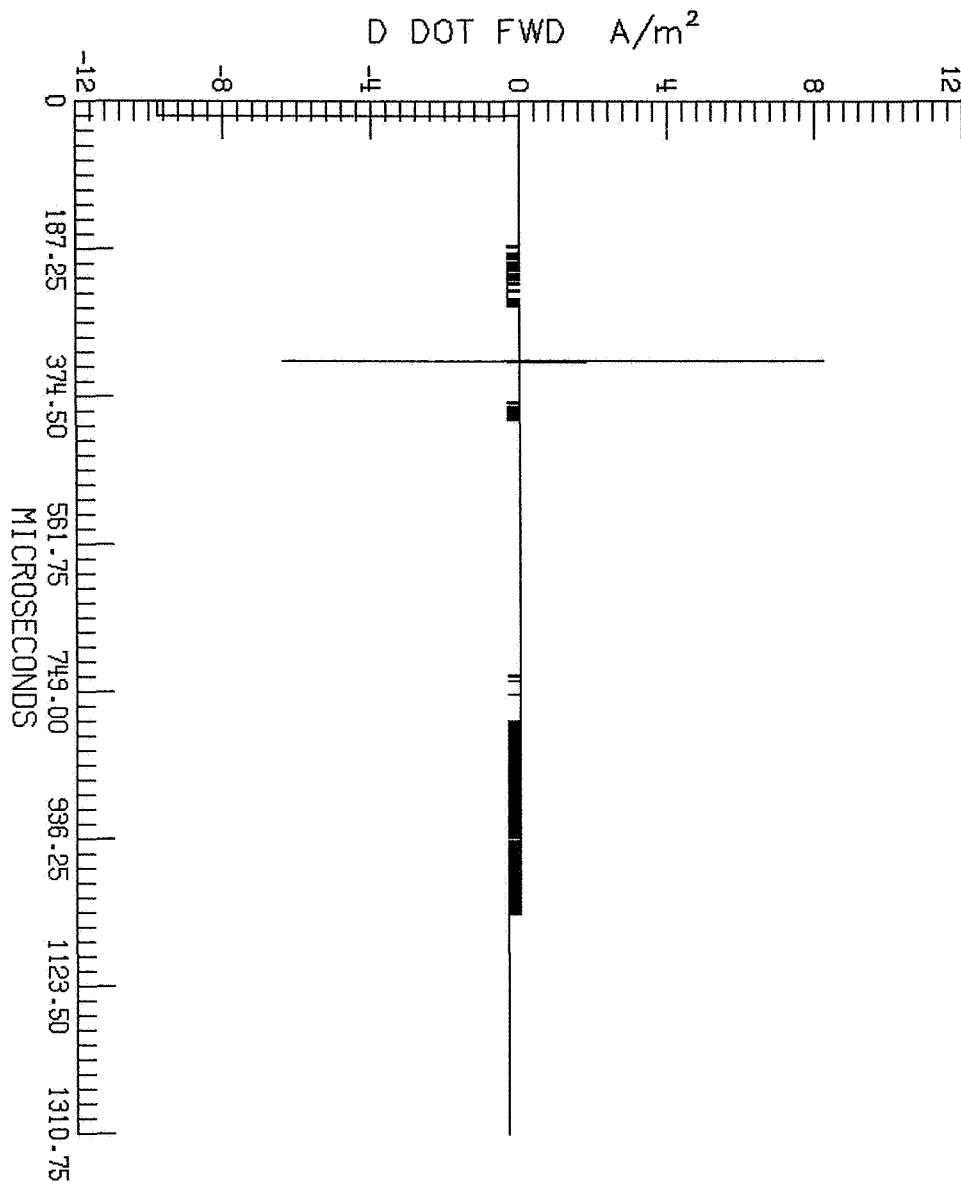


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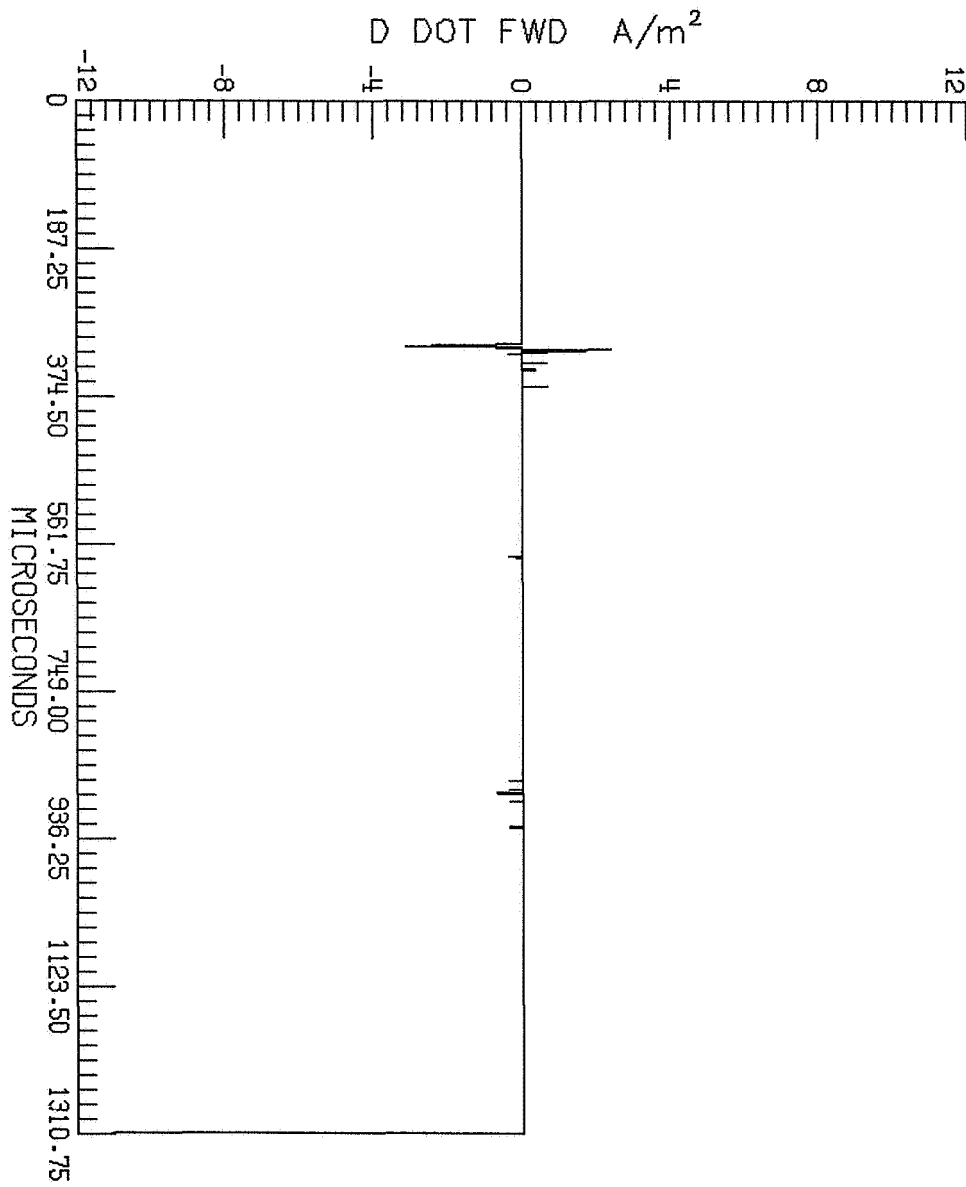


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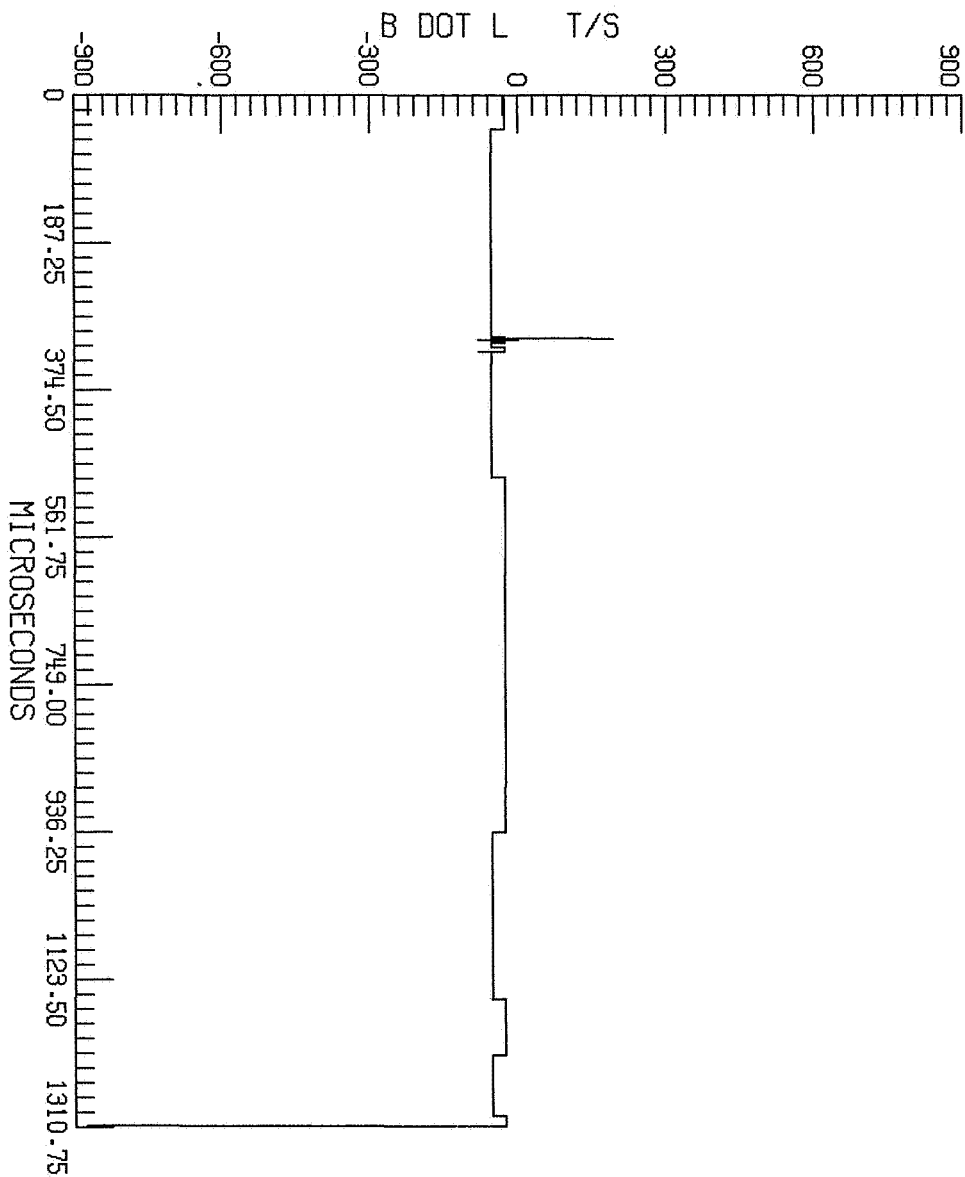
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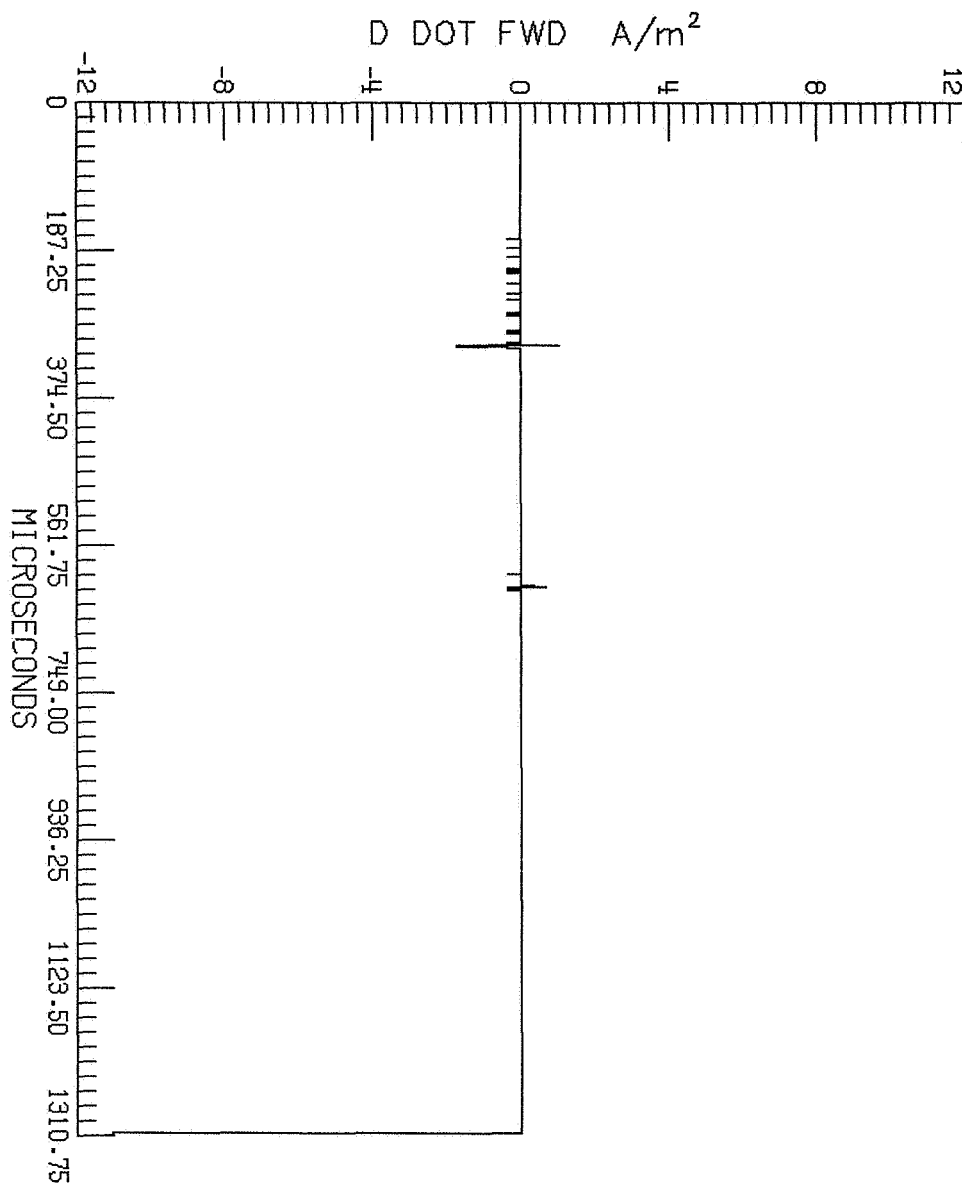
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F106 LIGHTNING/TK 10/M.THOMAS

TEST NO. 82-032

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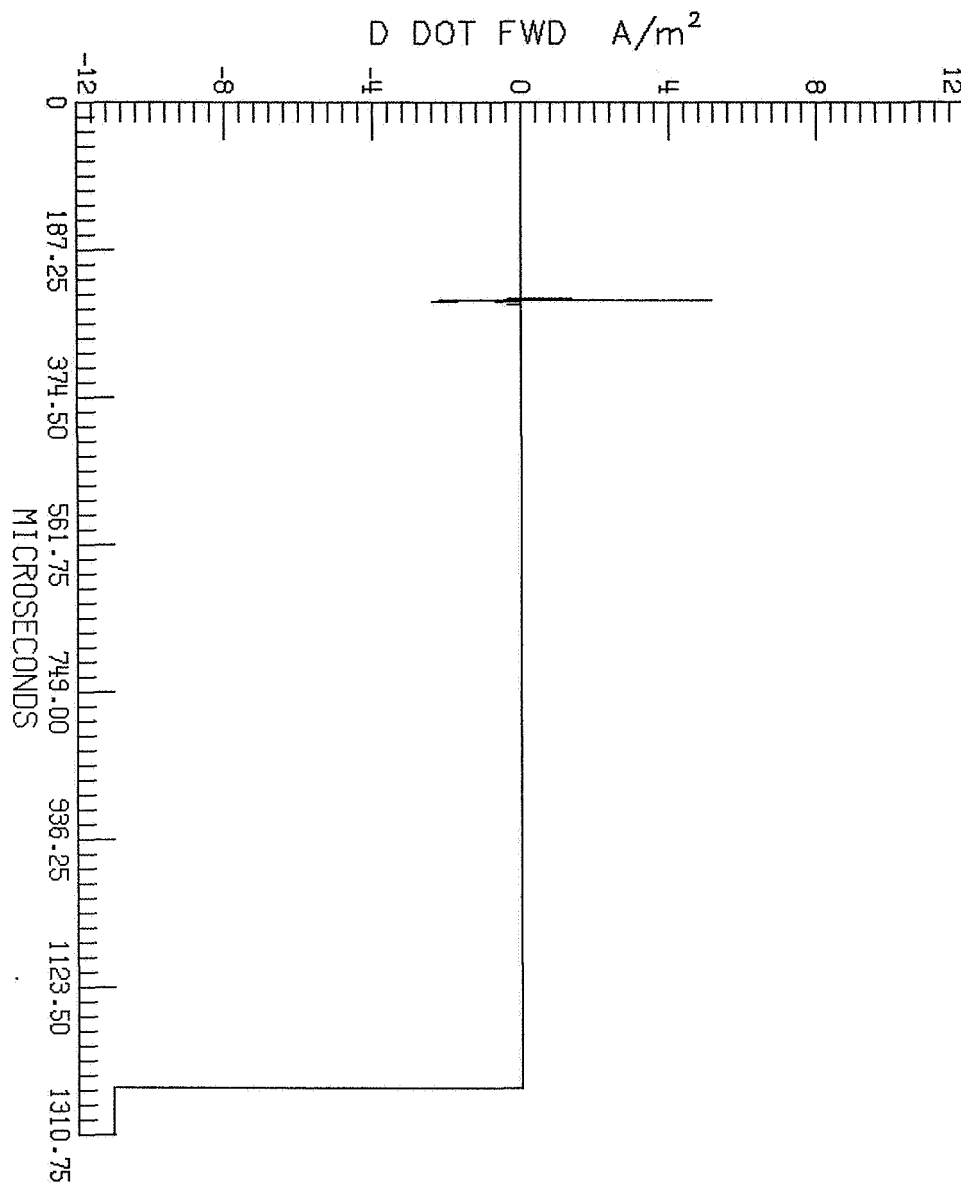


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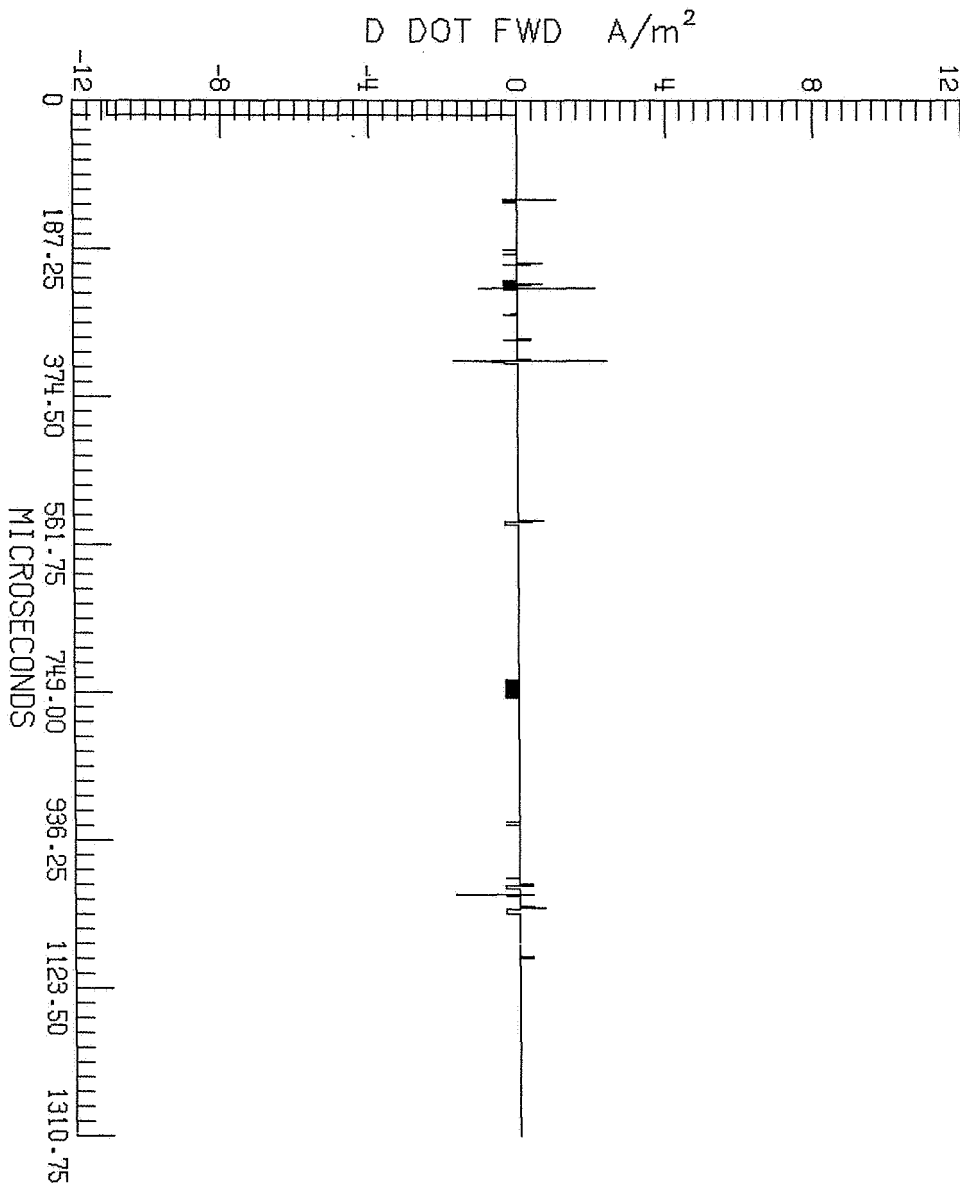
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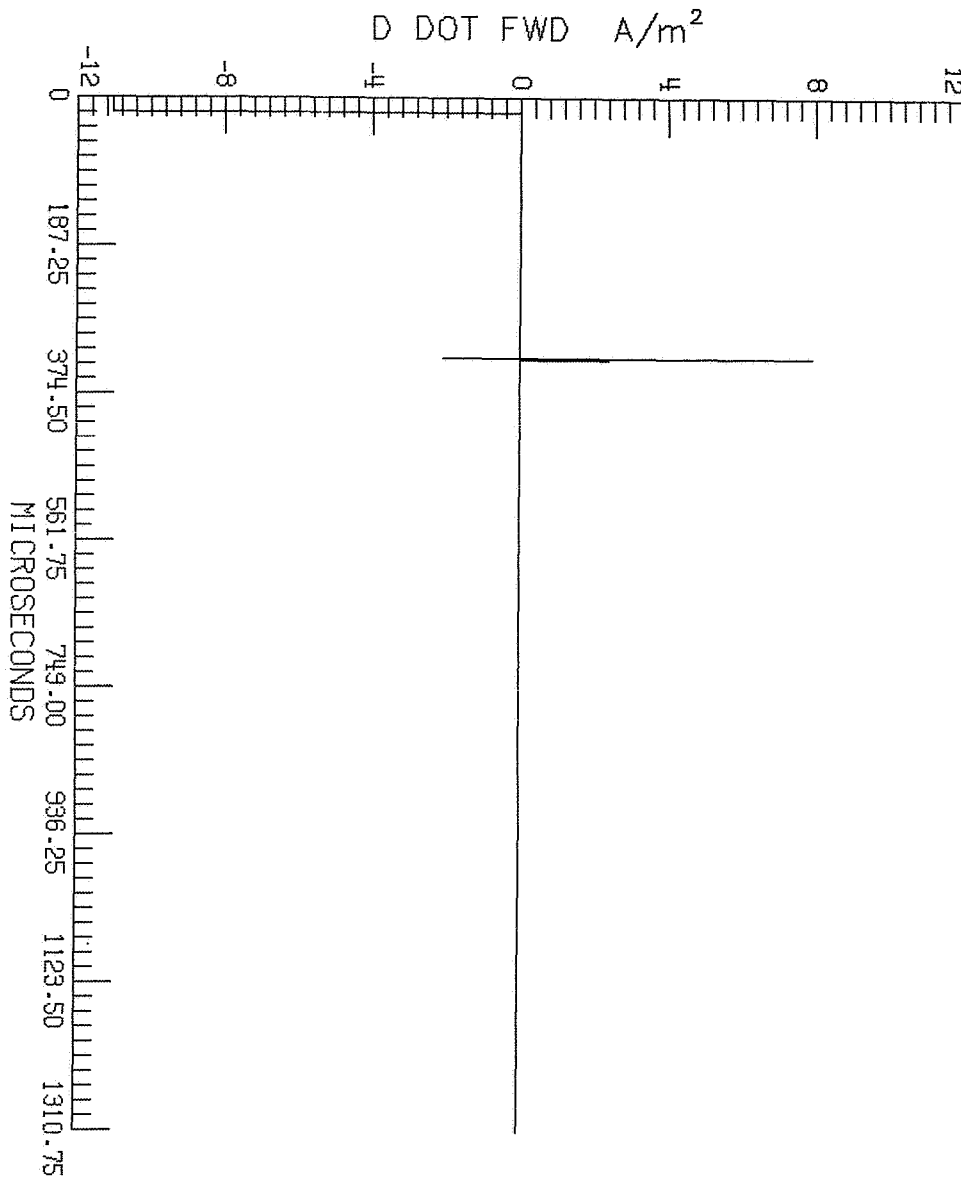


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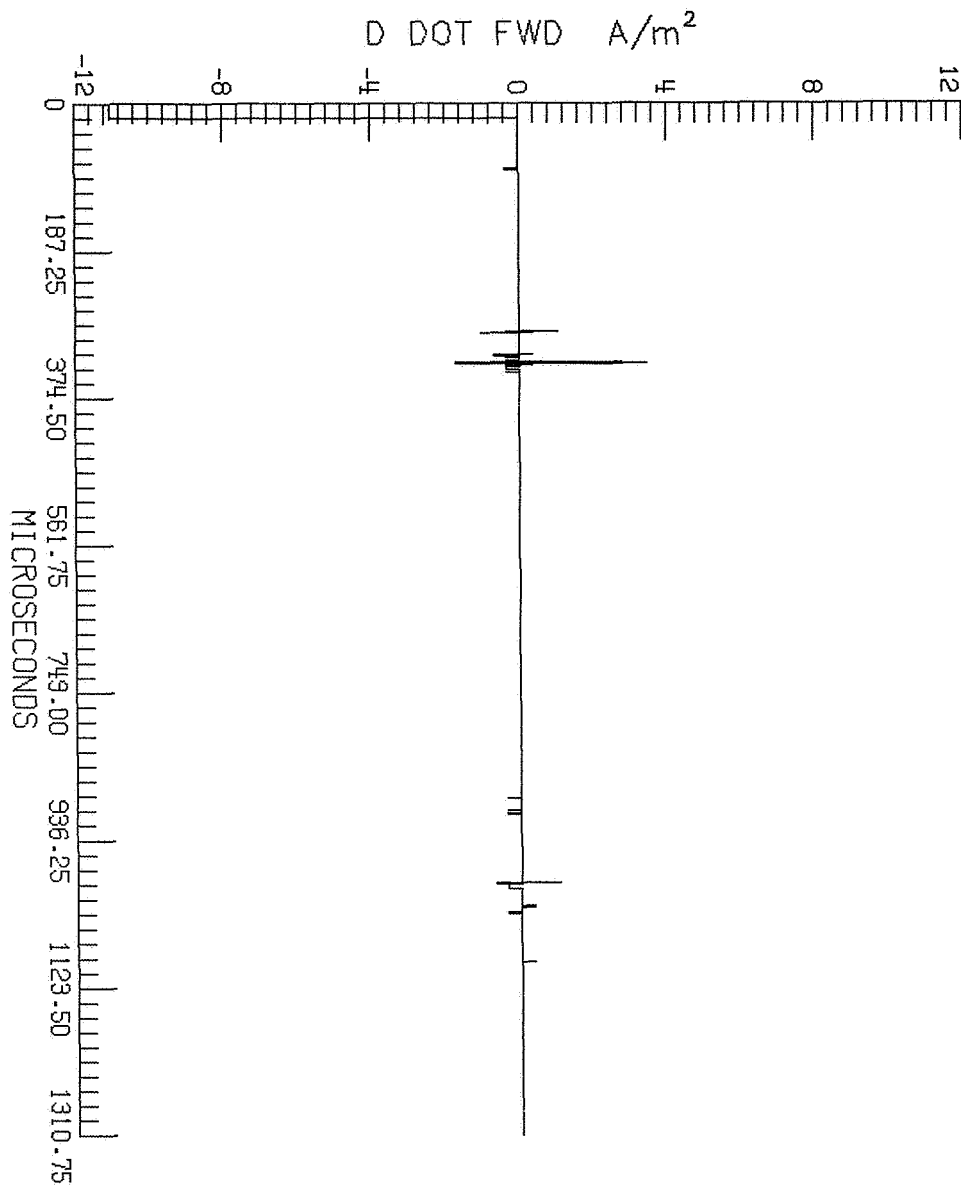


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TEST NO. 82-034

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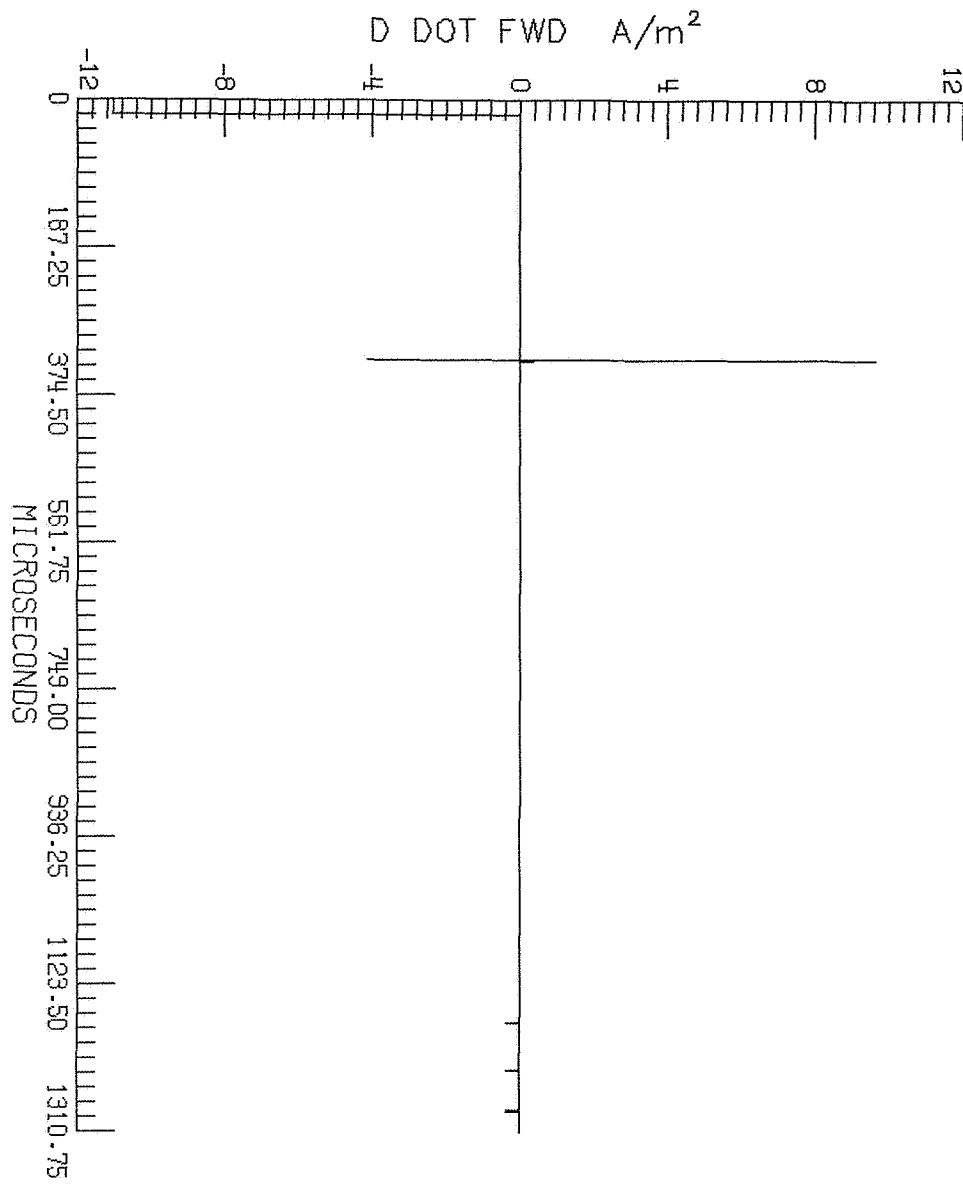


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TEST NO. 82-034

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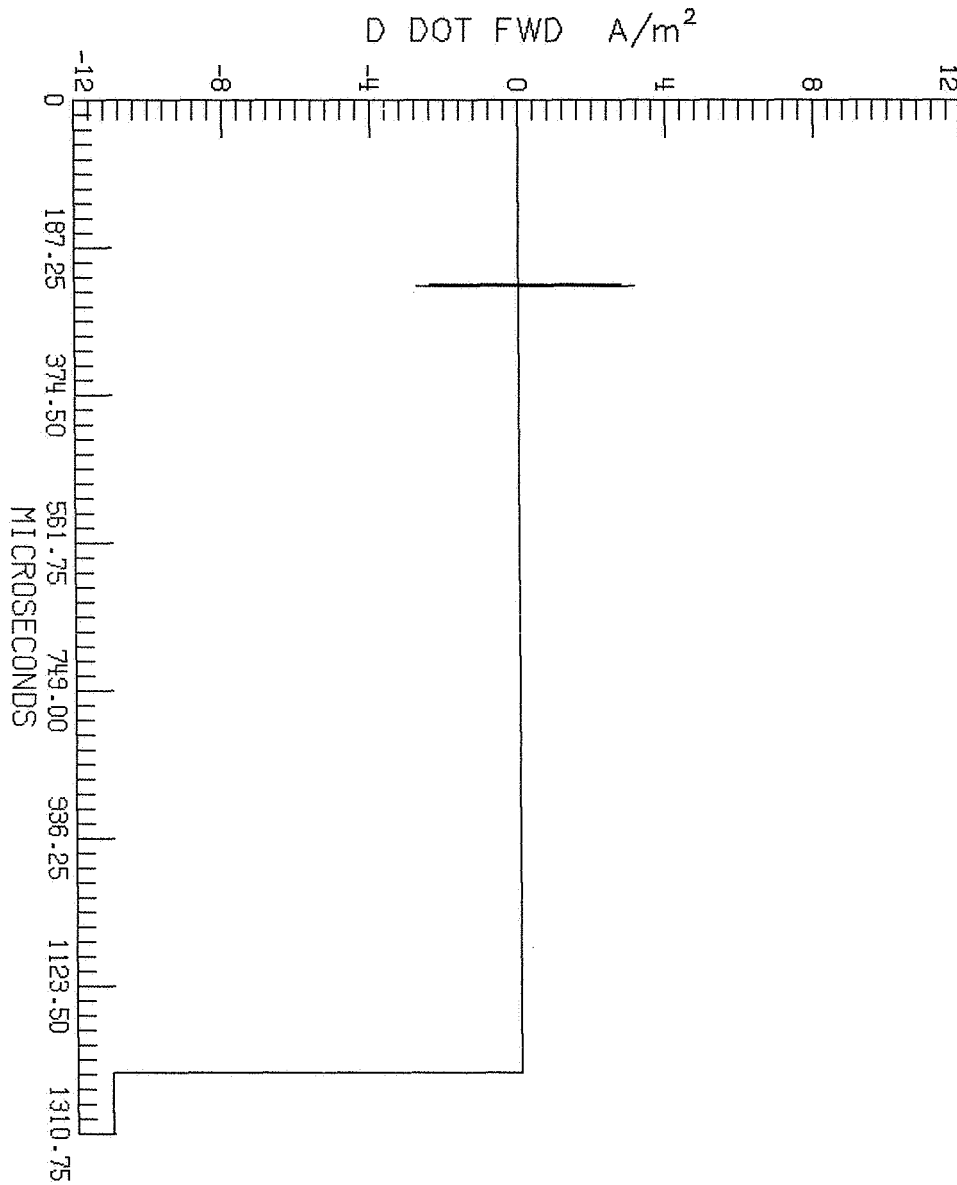


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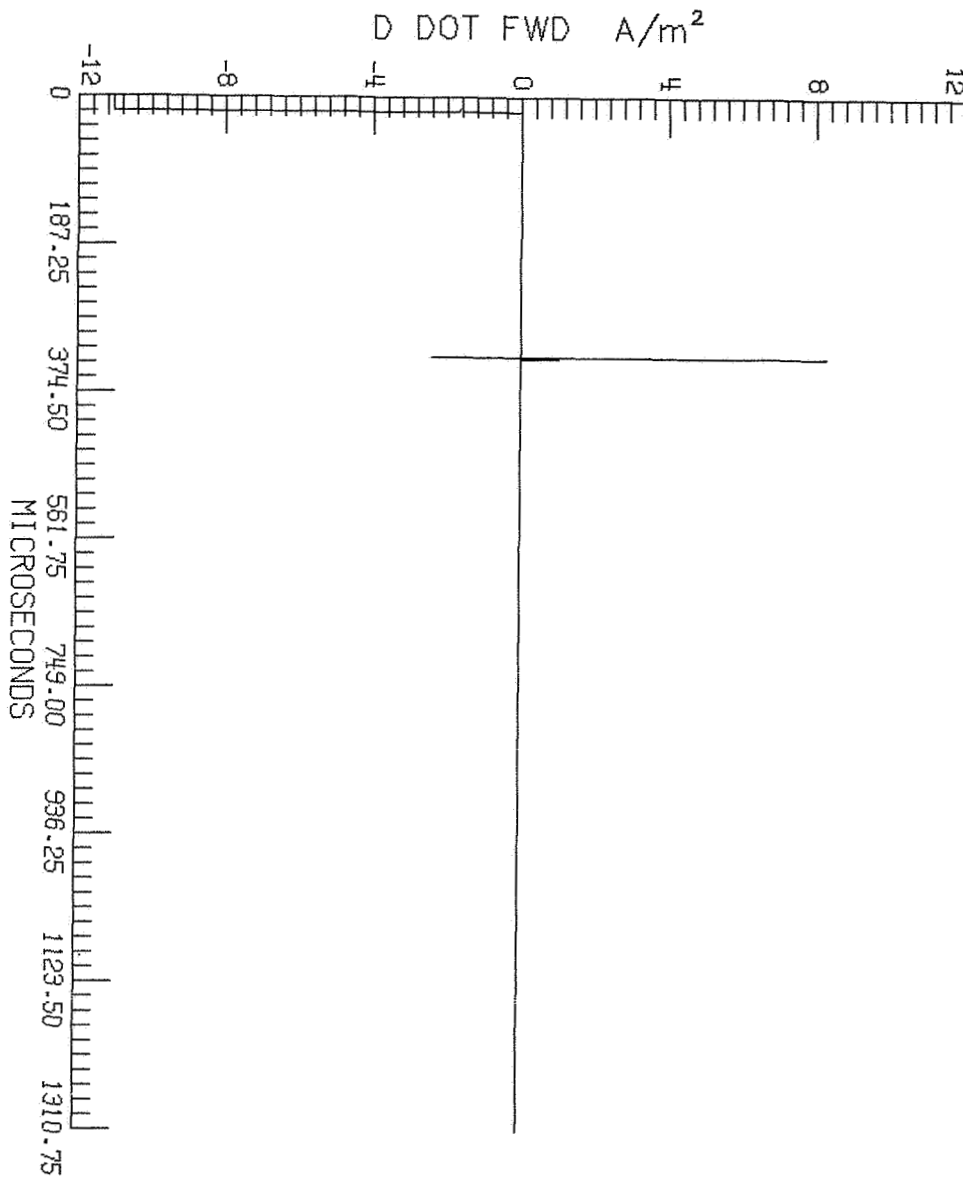


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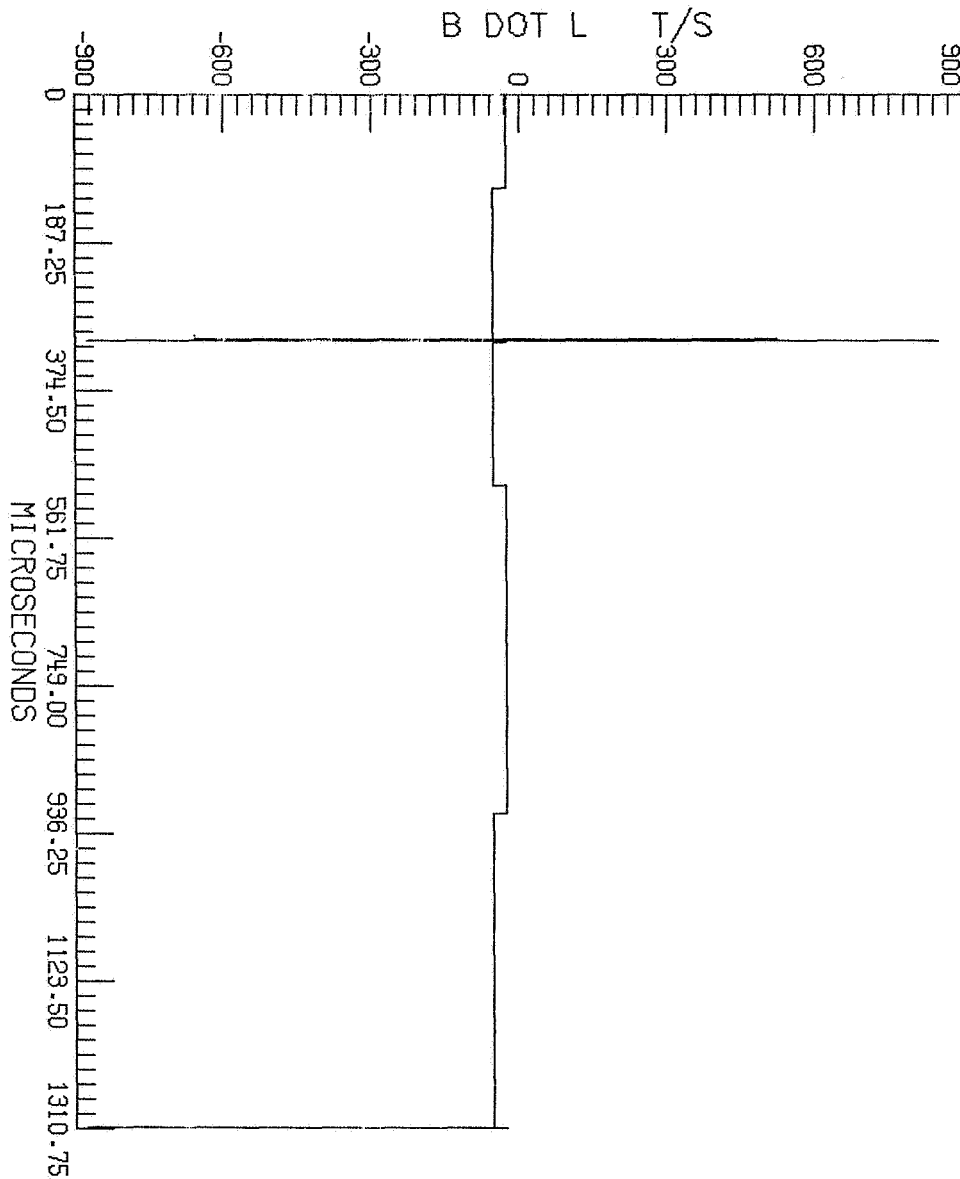


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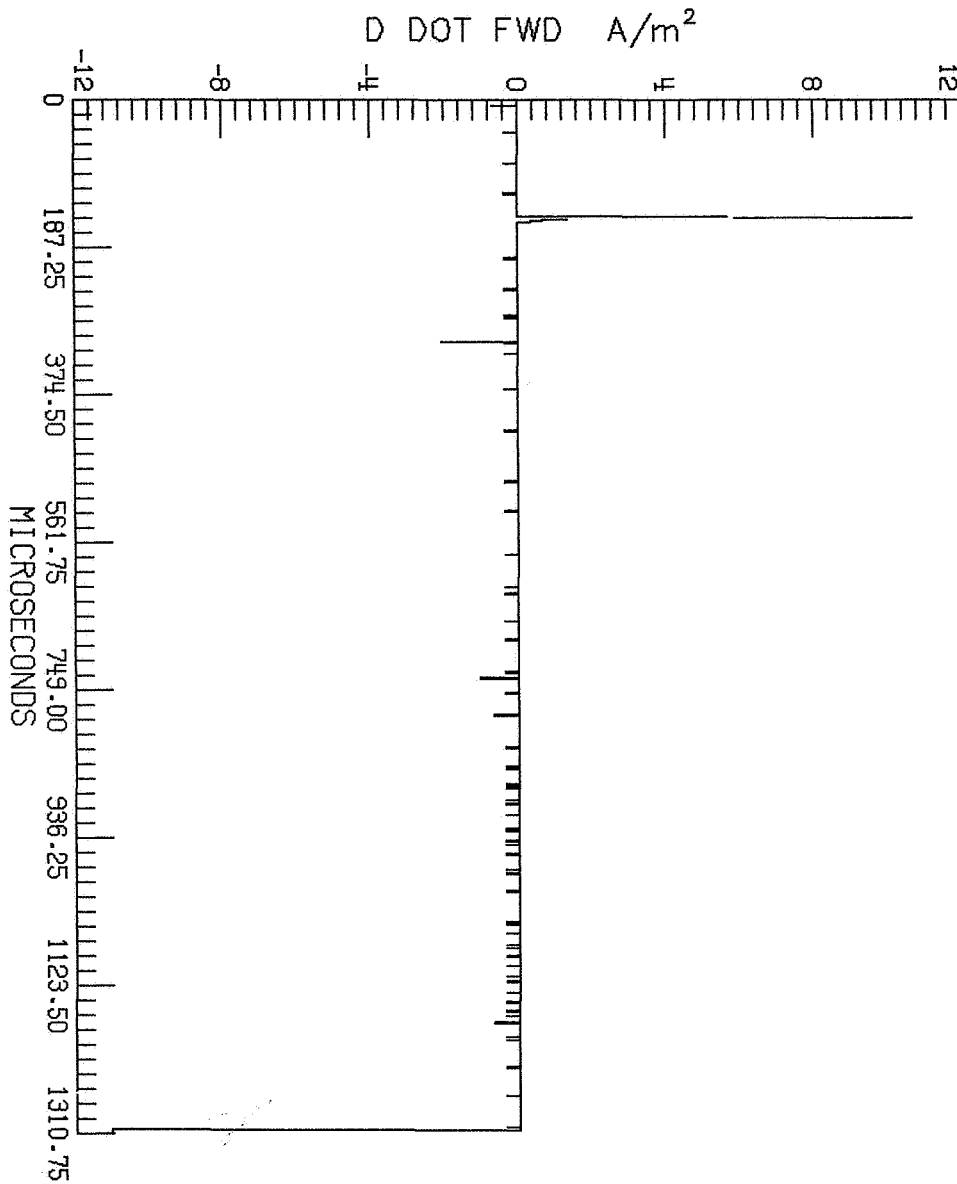


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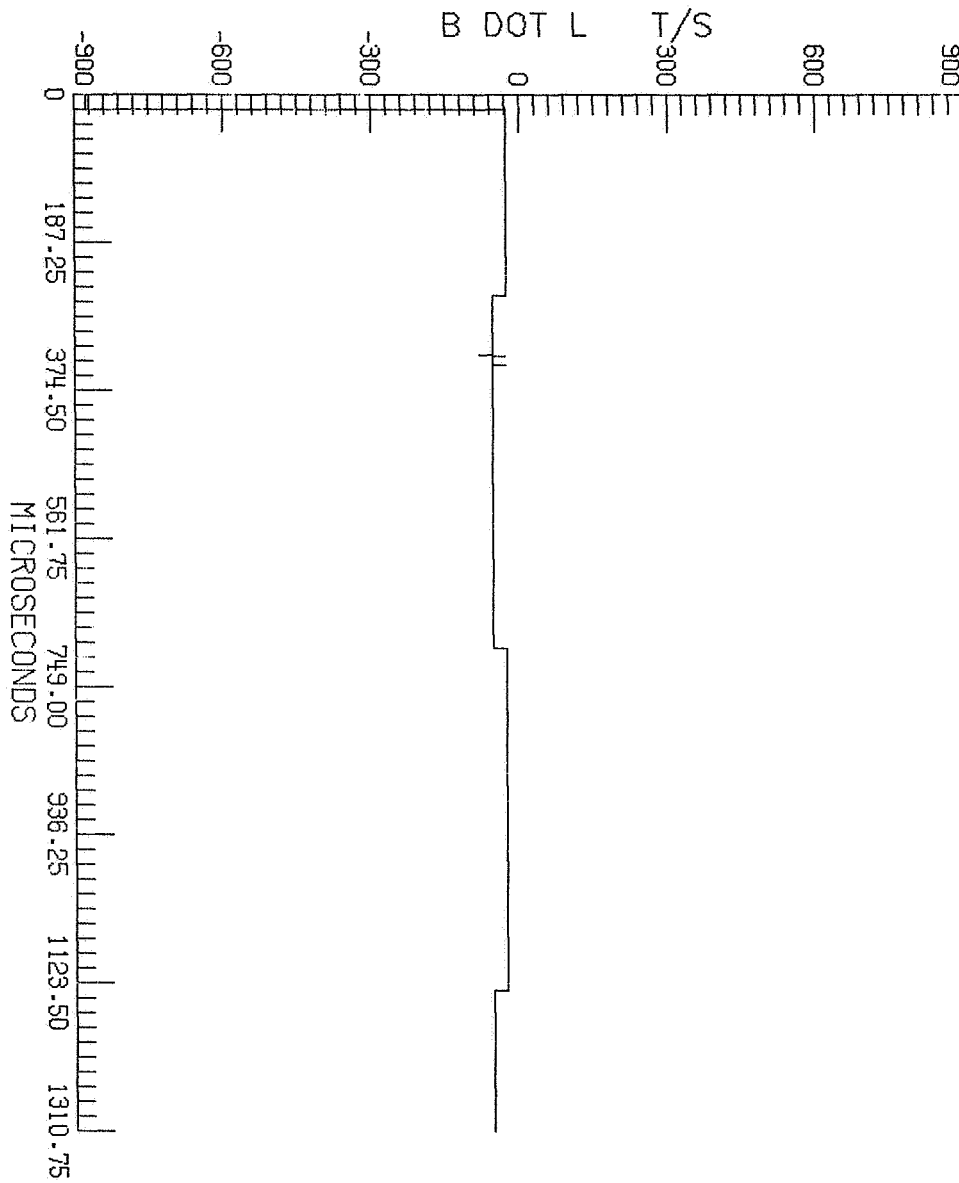


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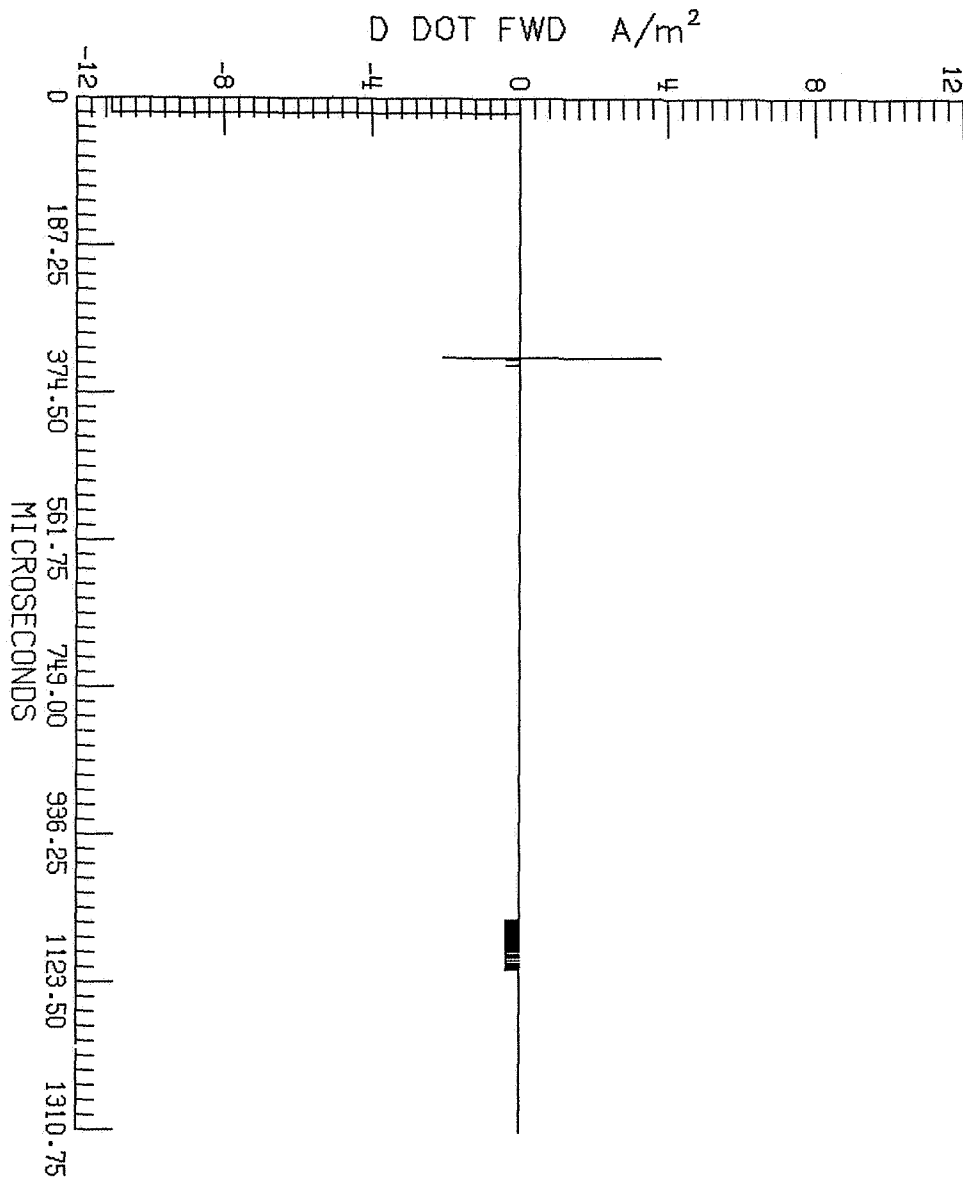


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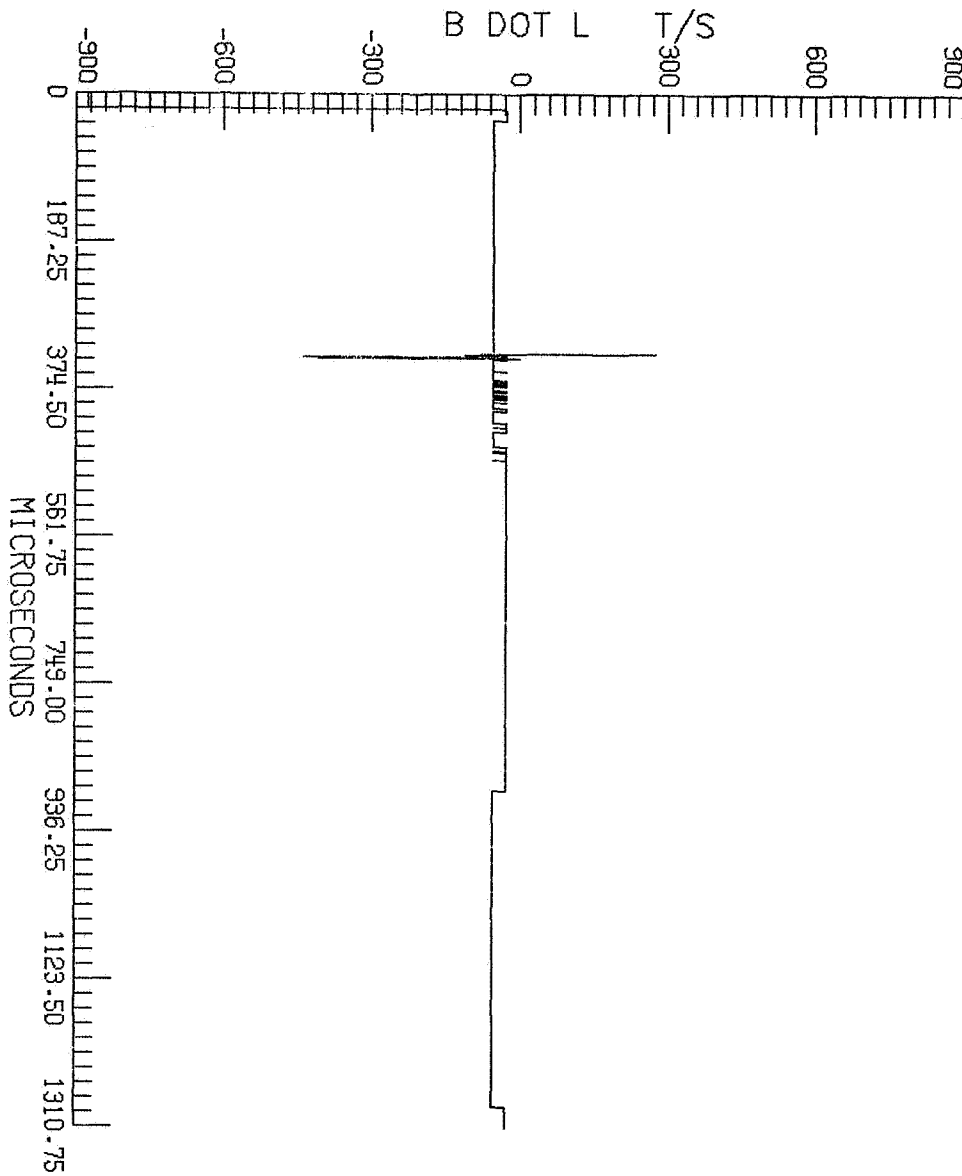


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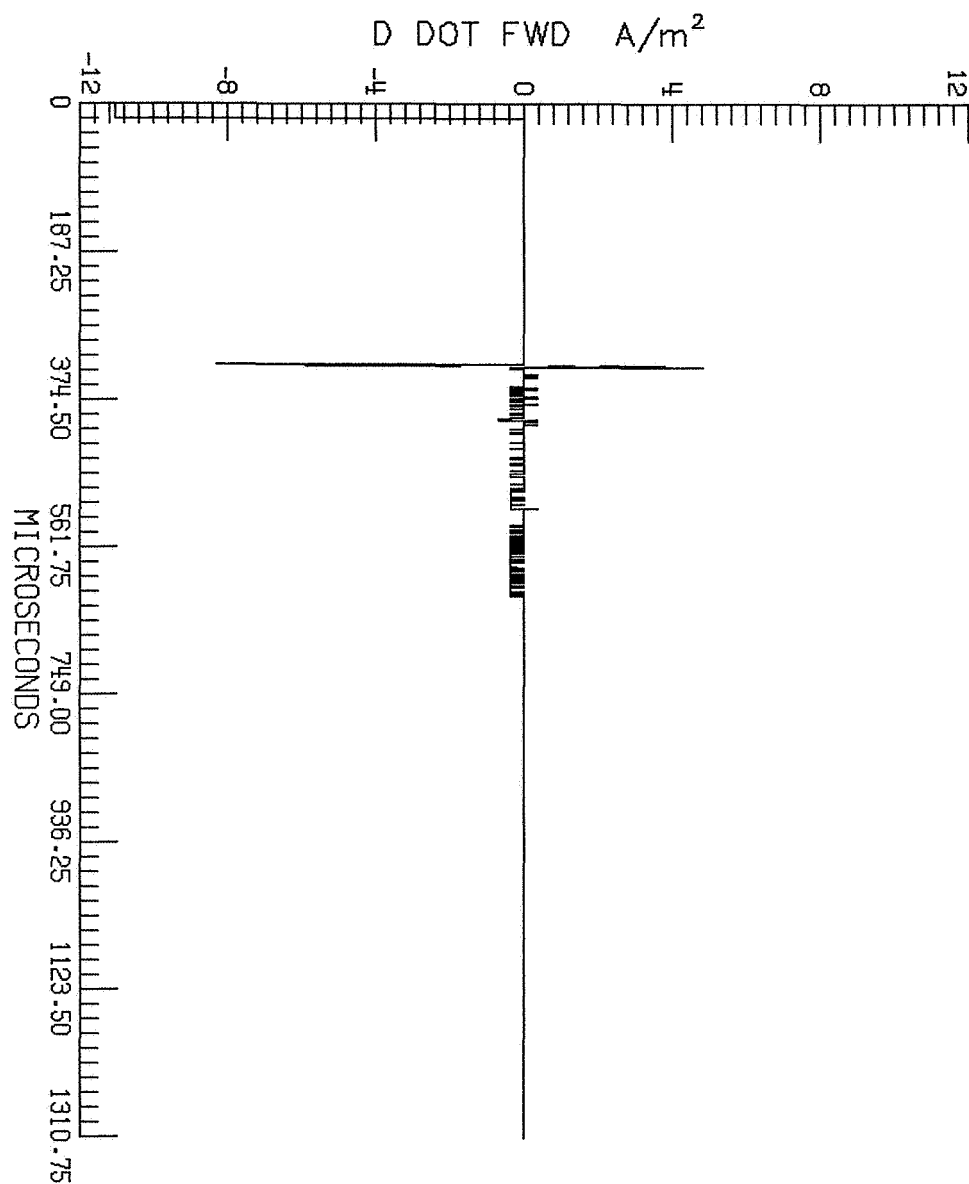


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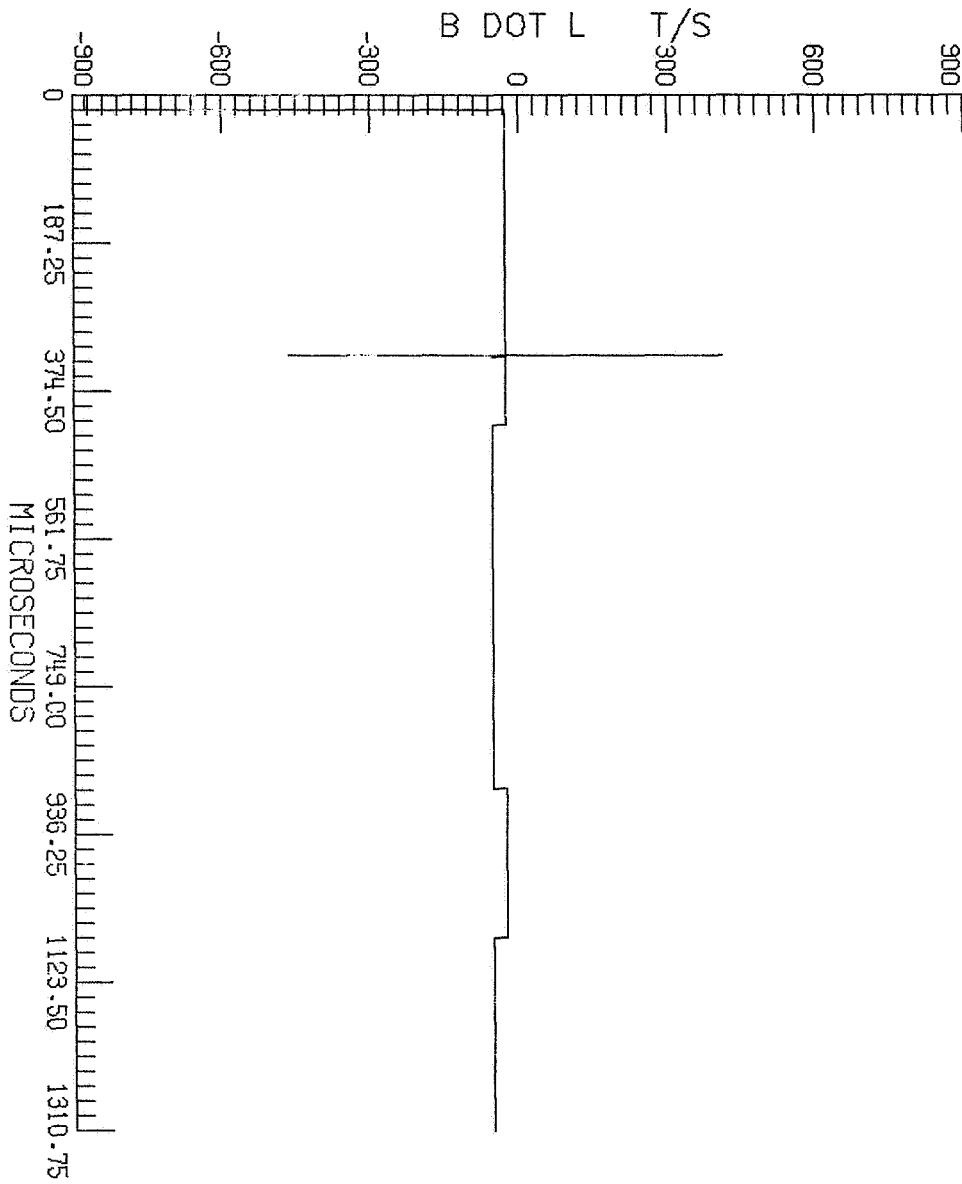
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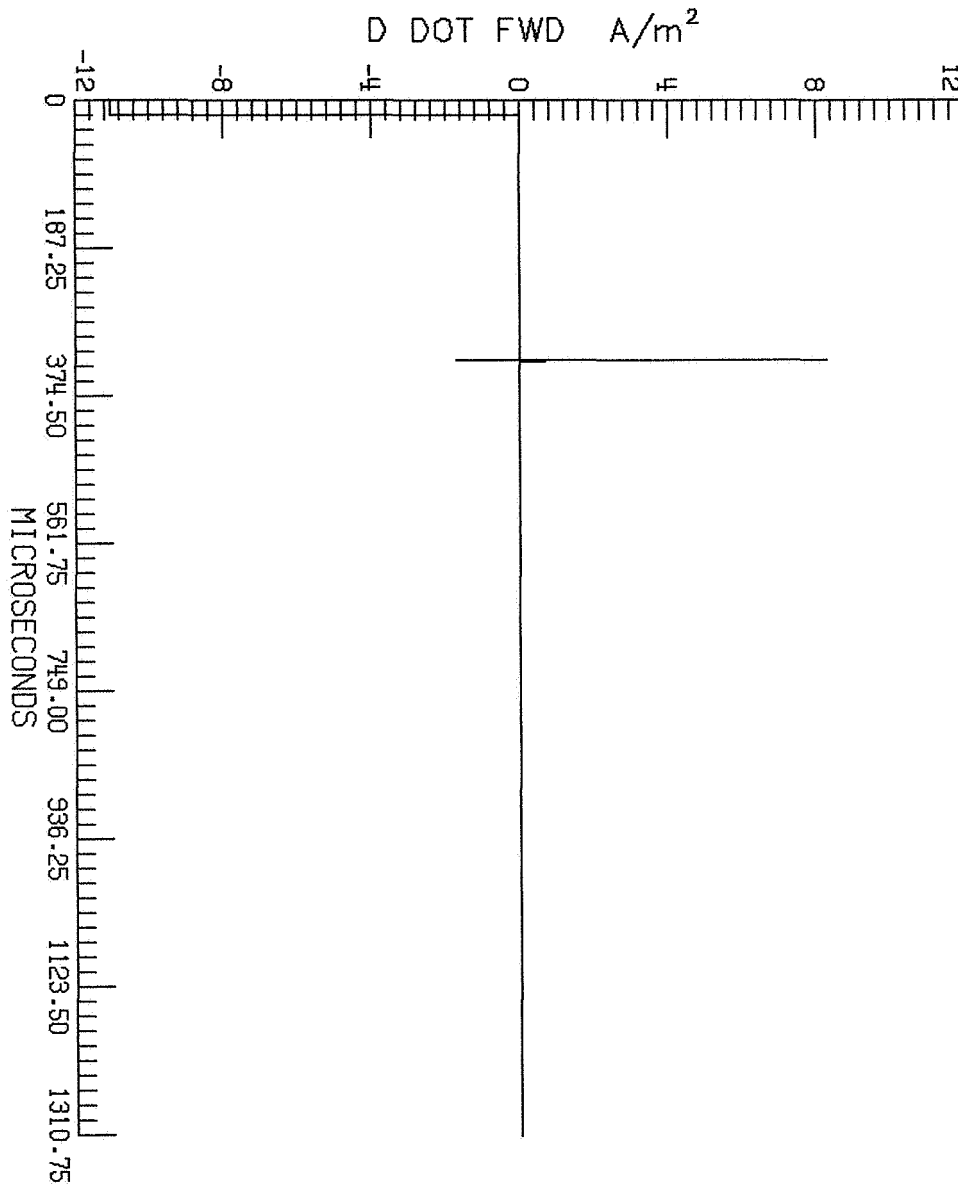


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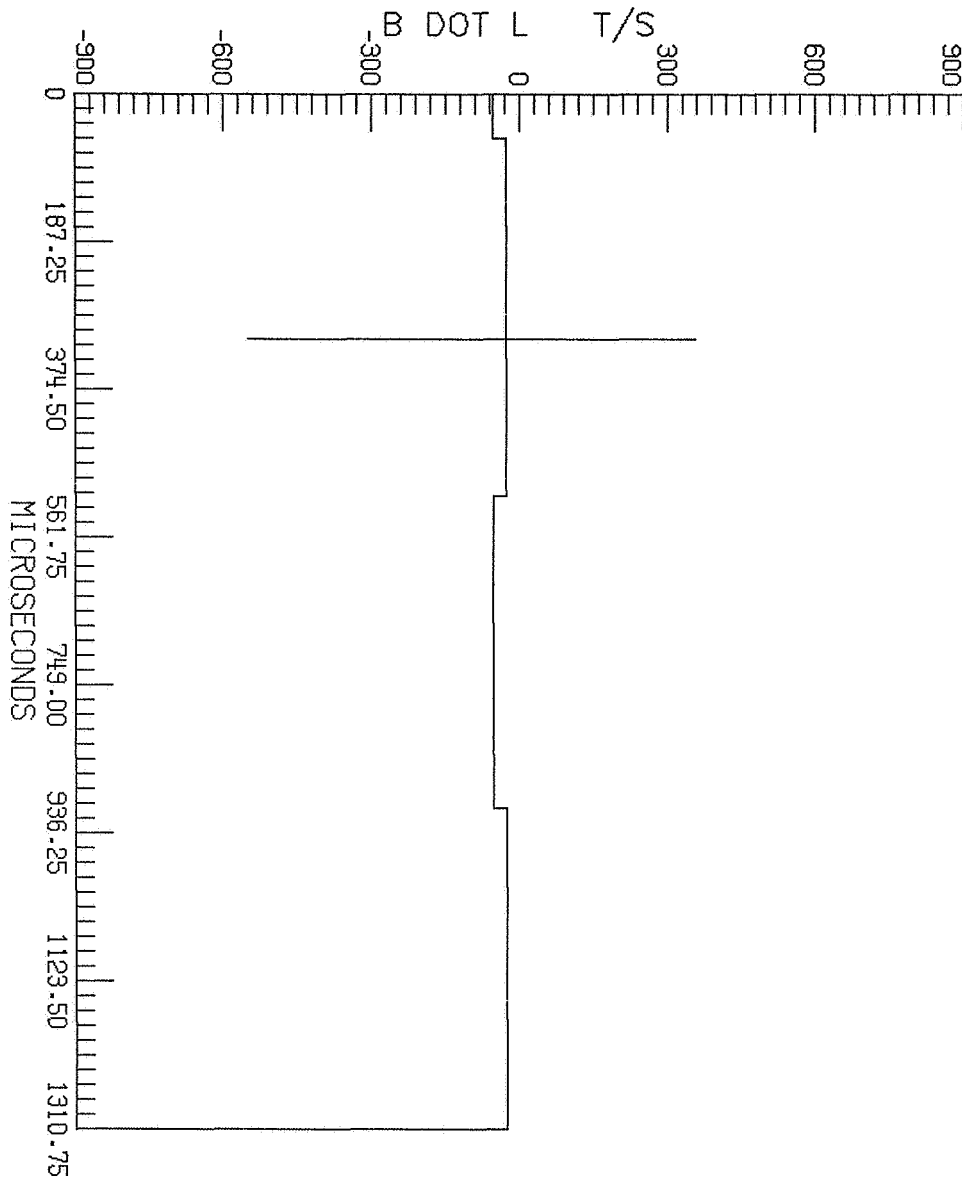


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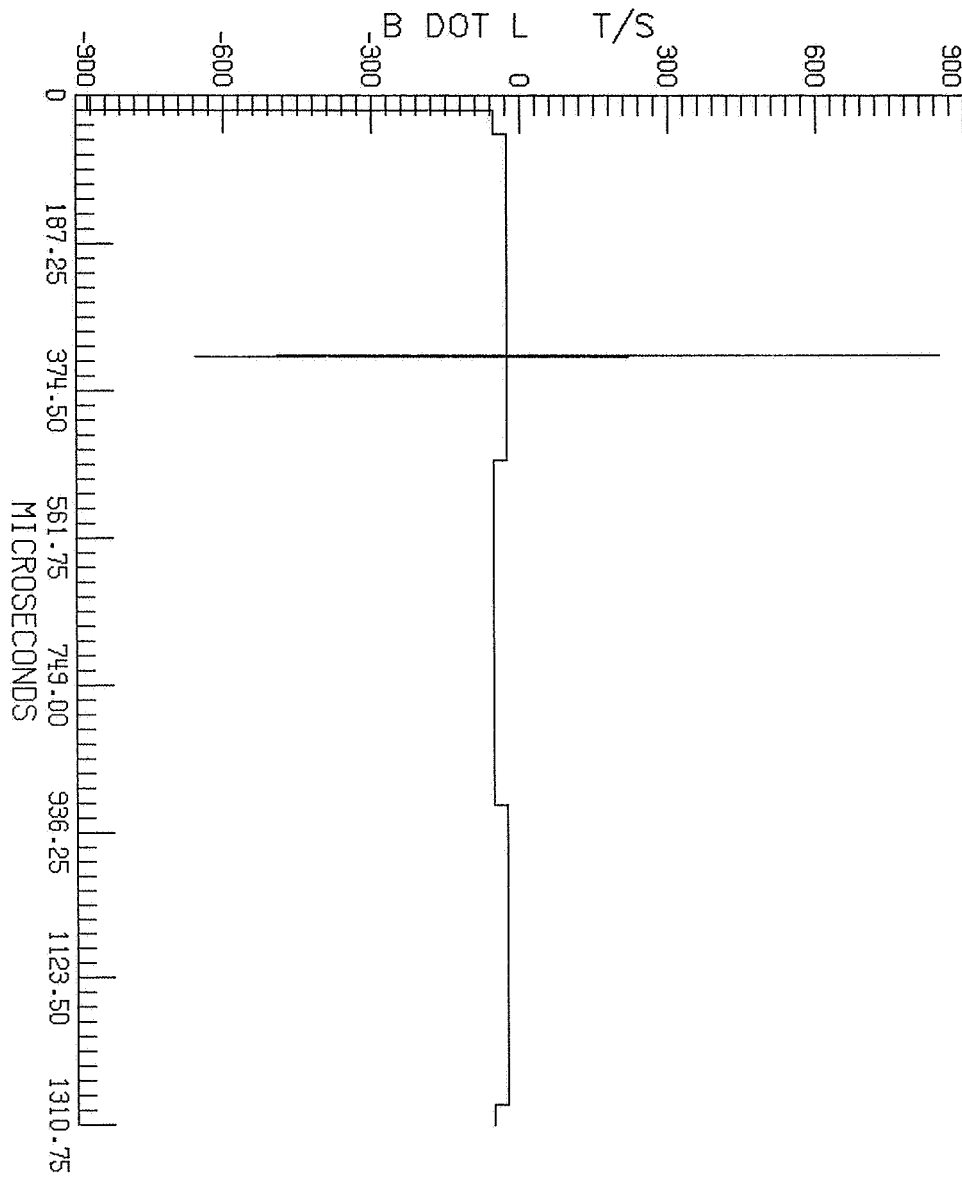


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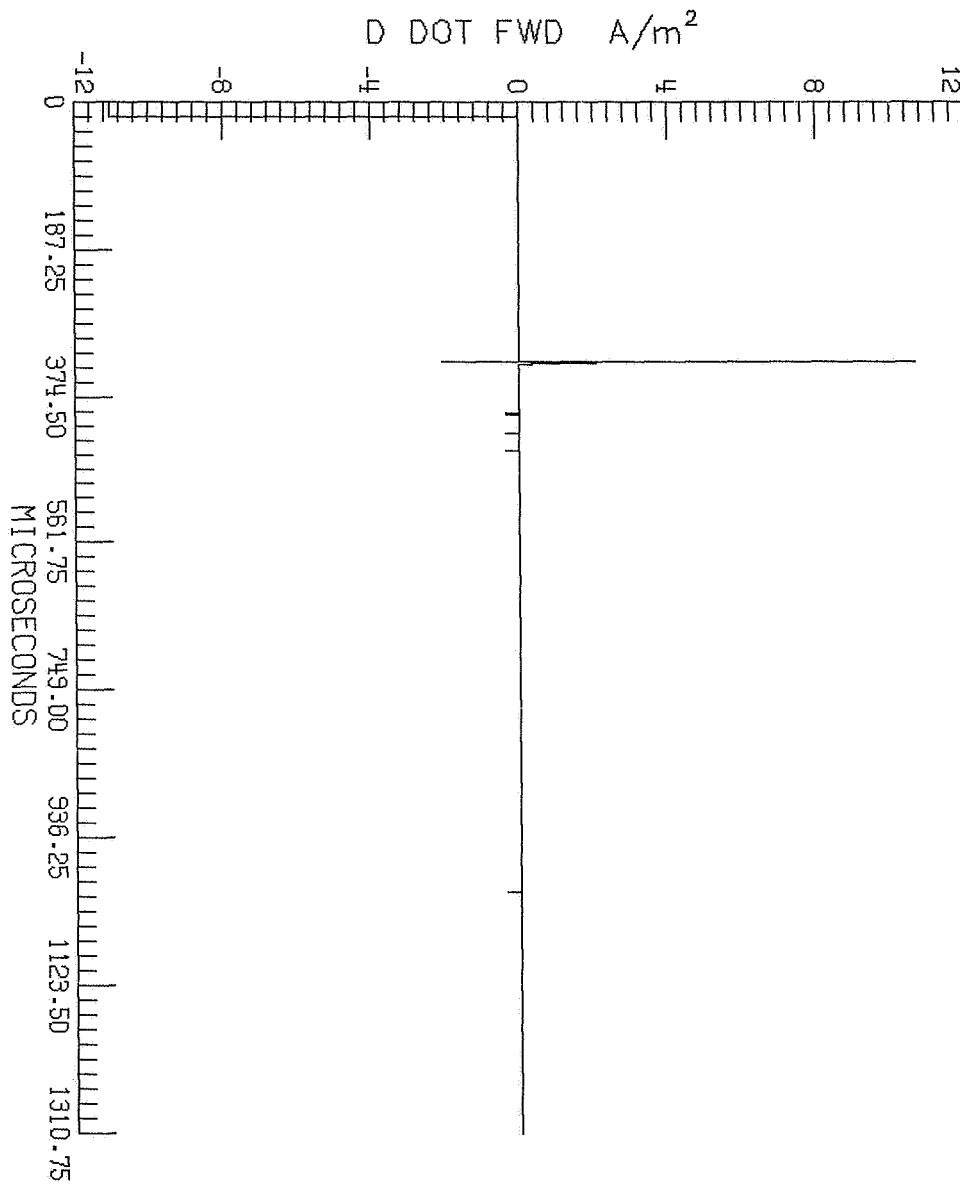
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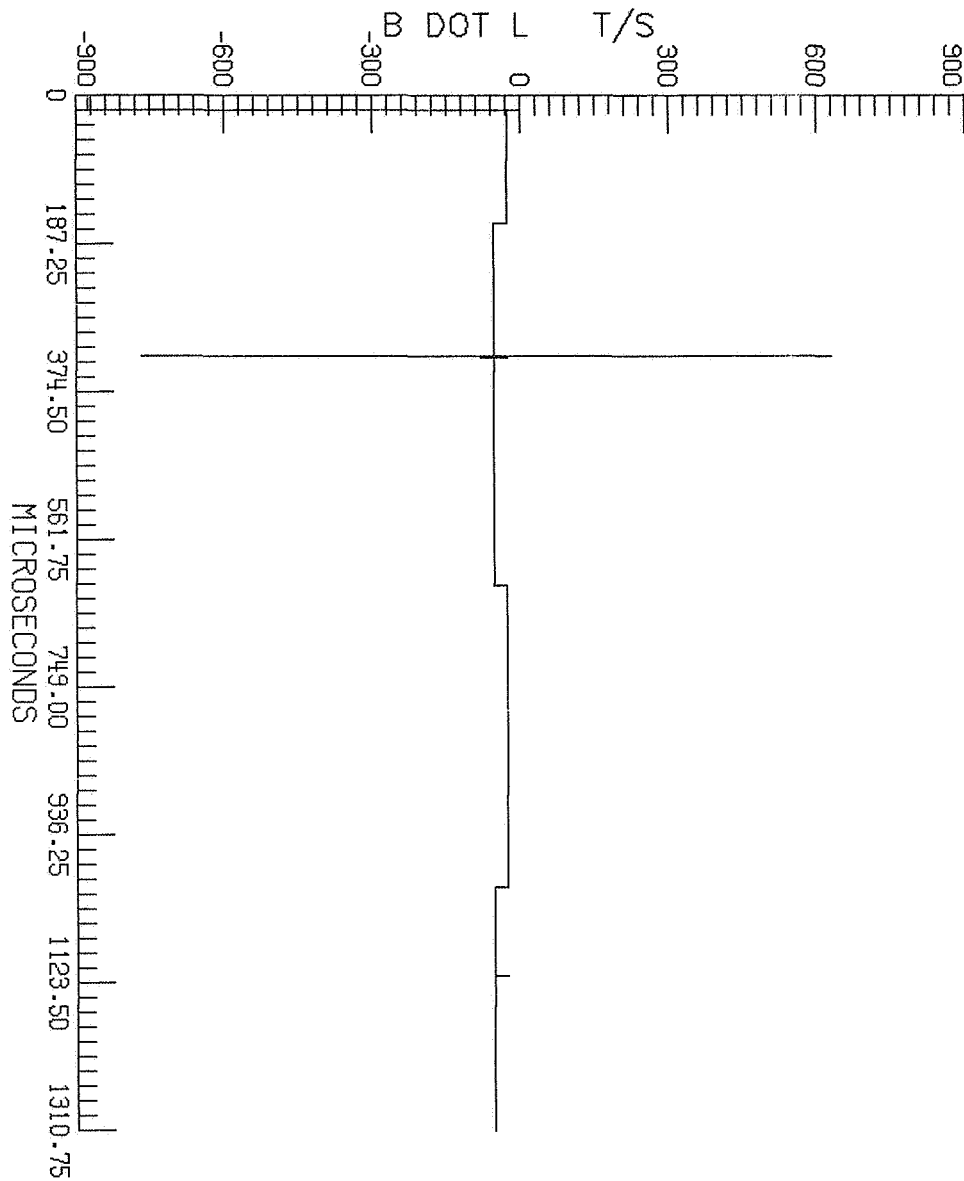


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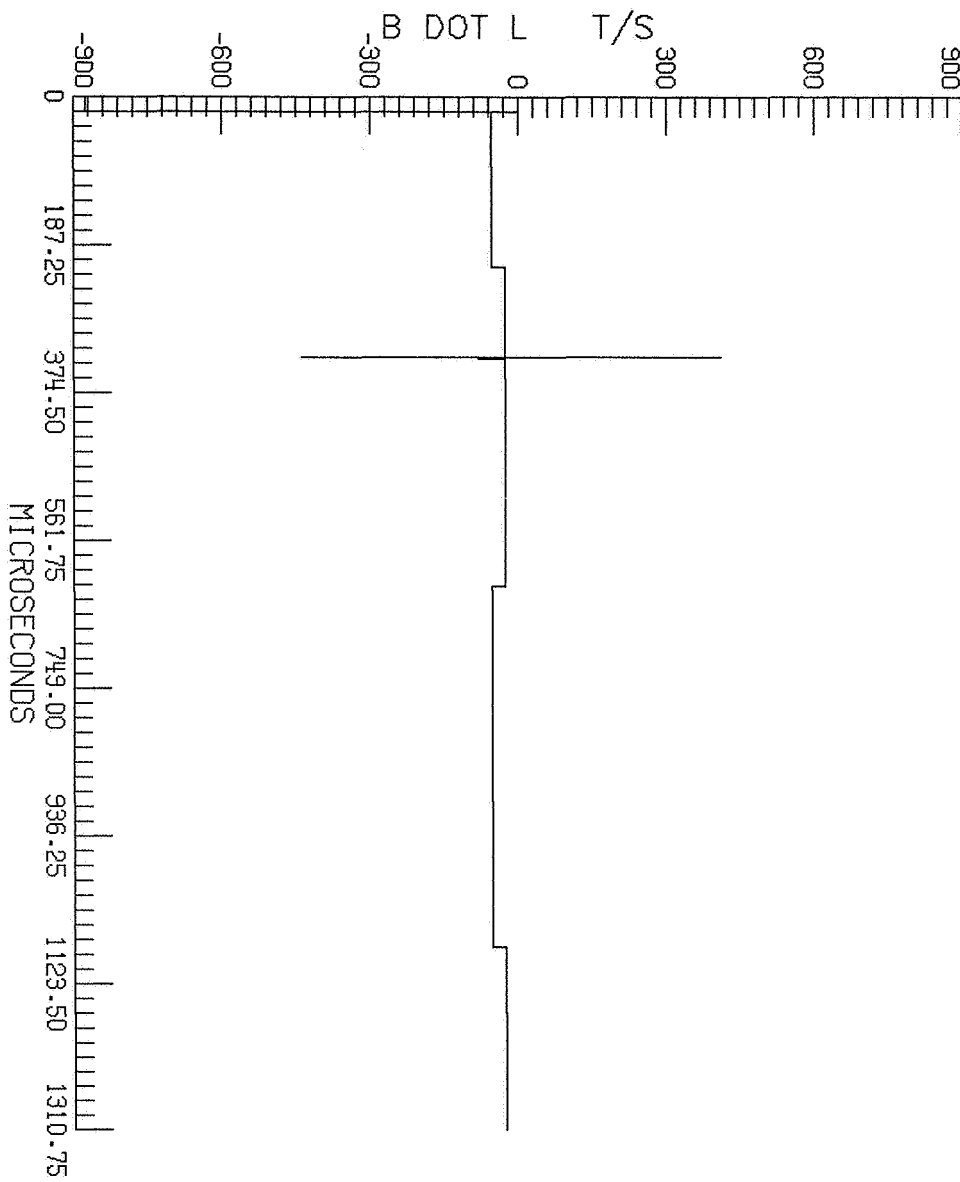
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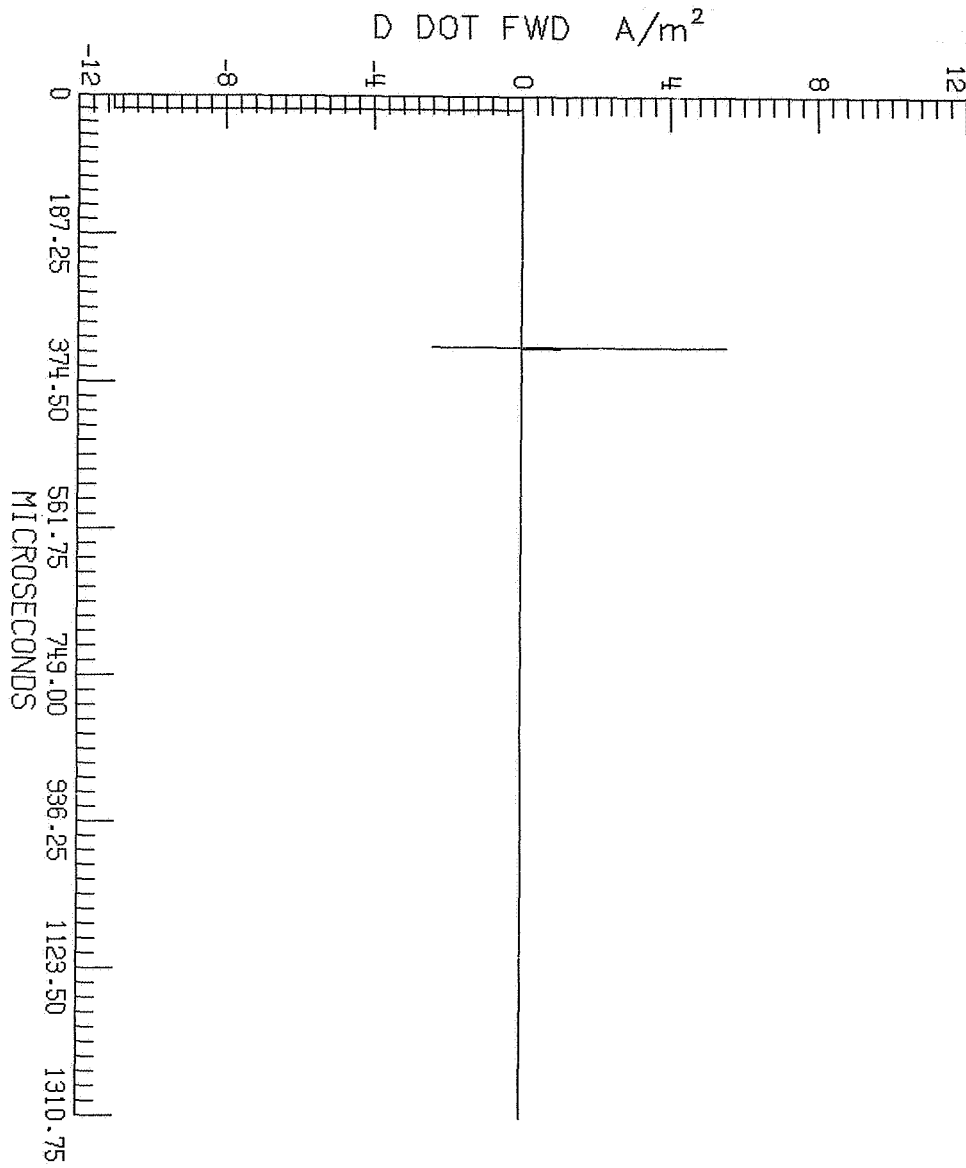
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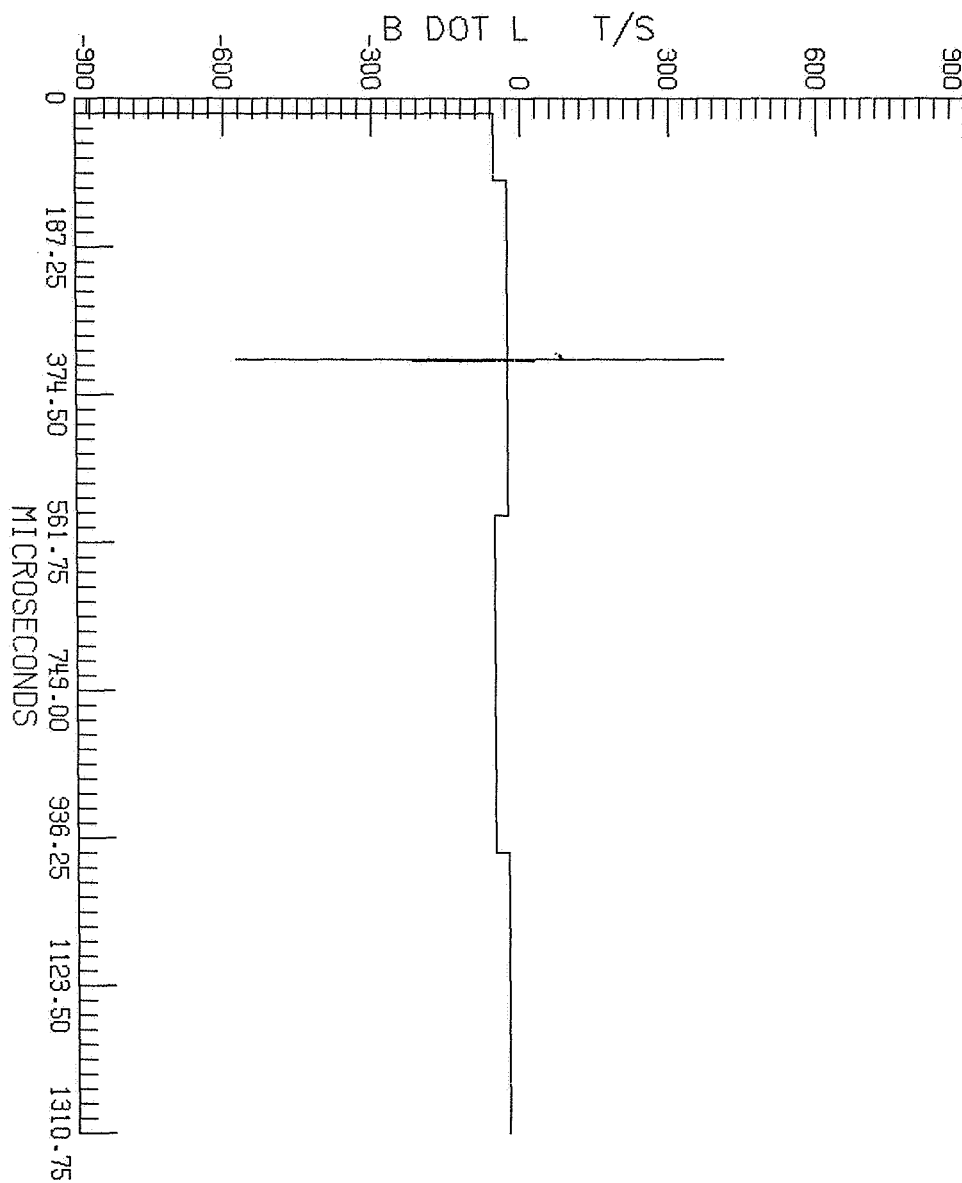


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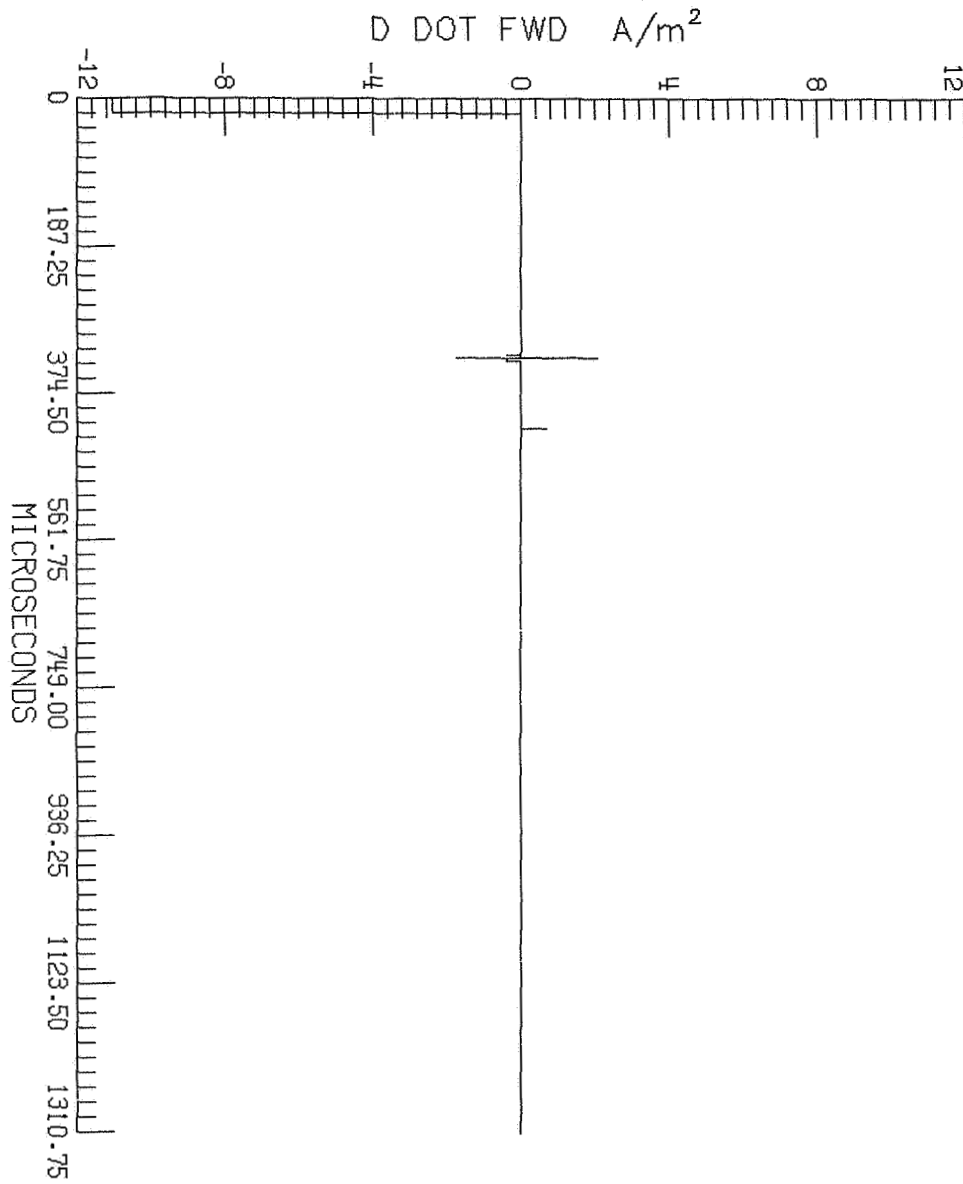


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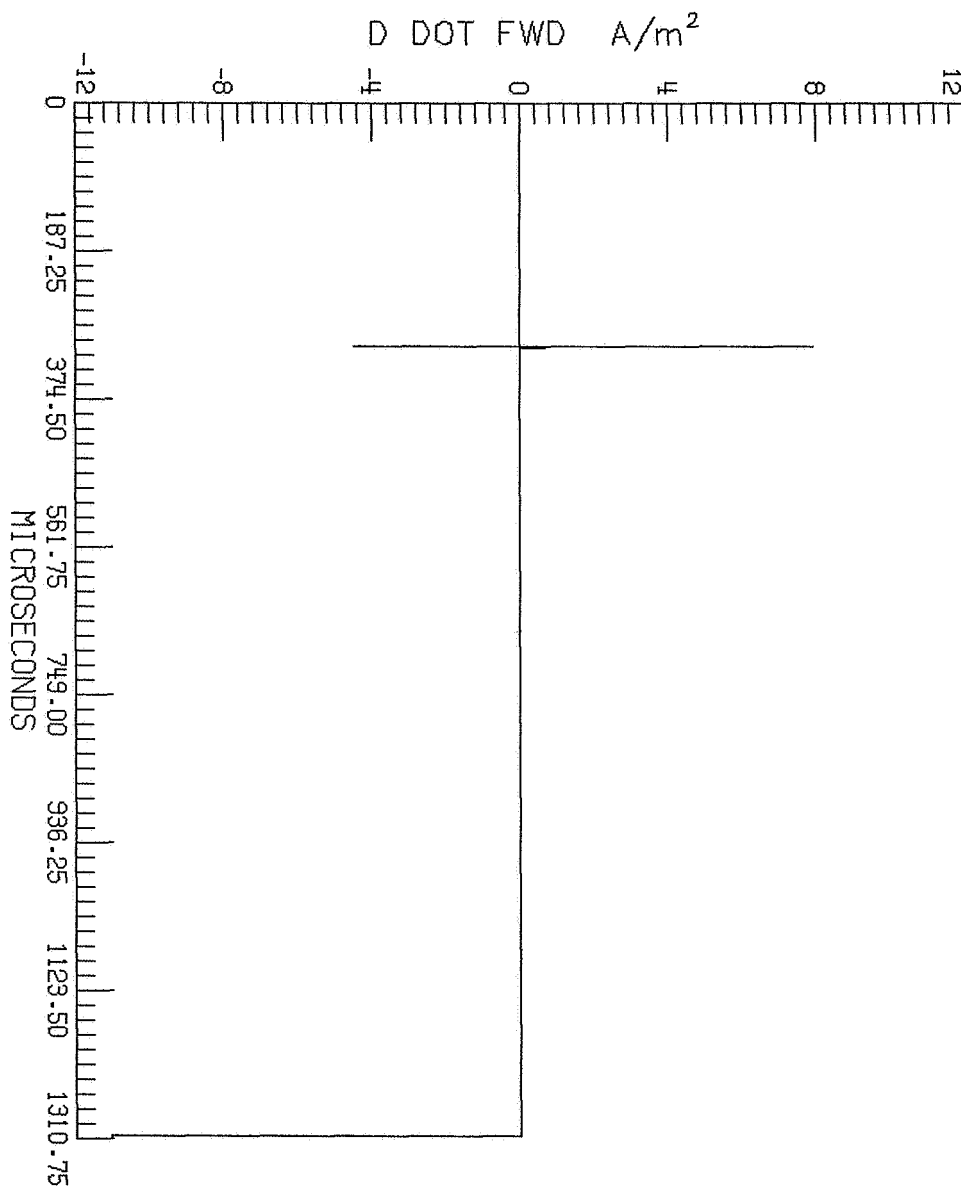


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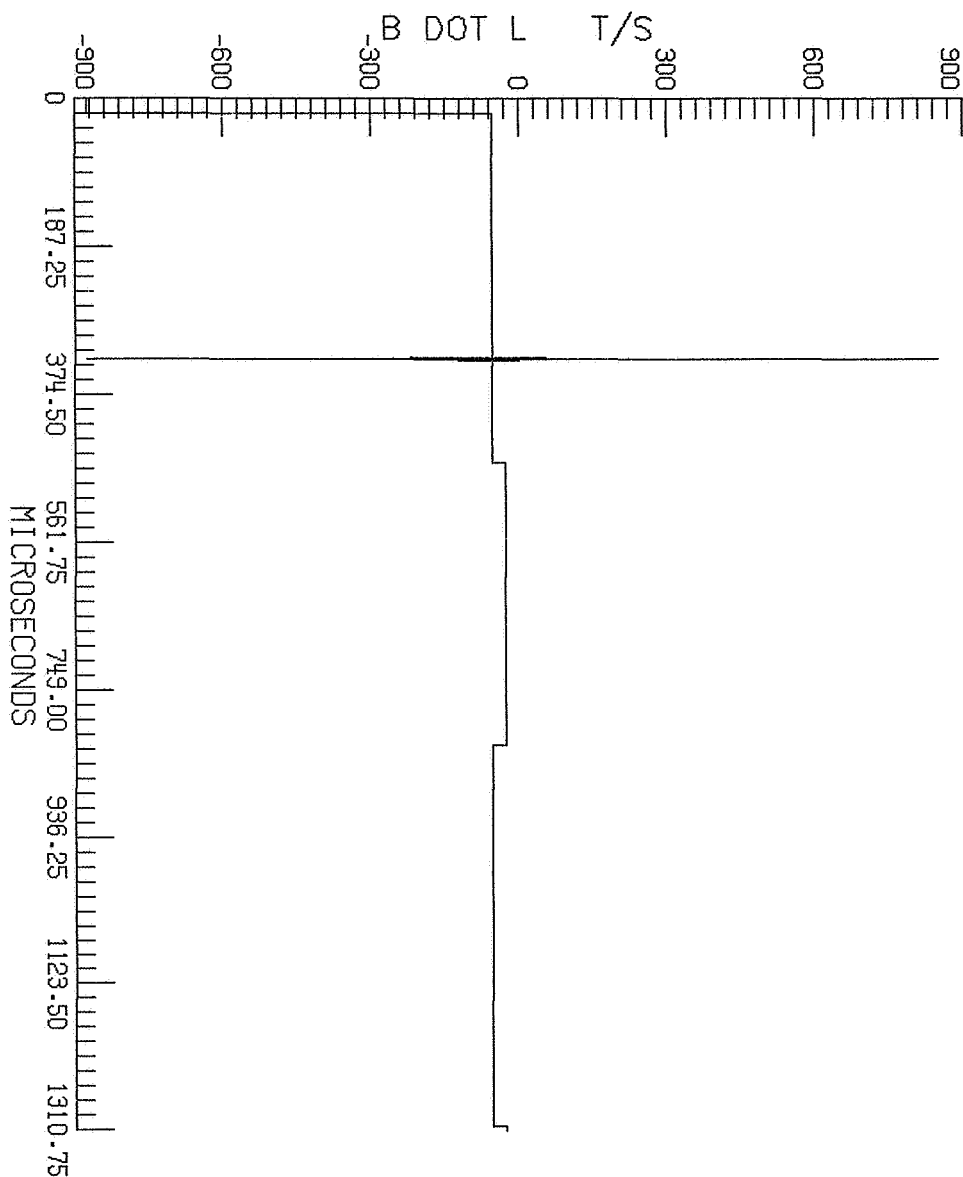


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TEST NO. 82-038

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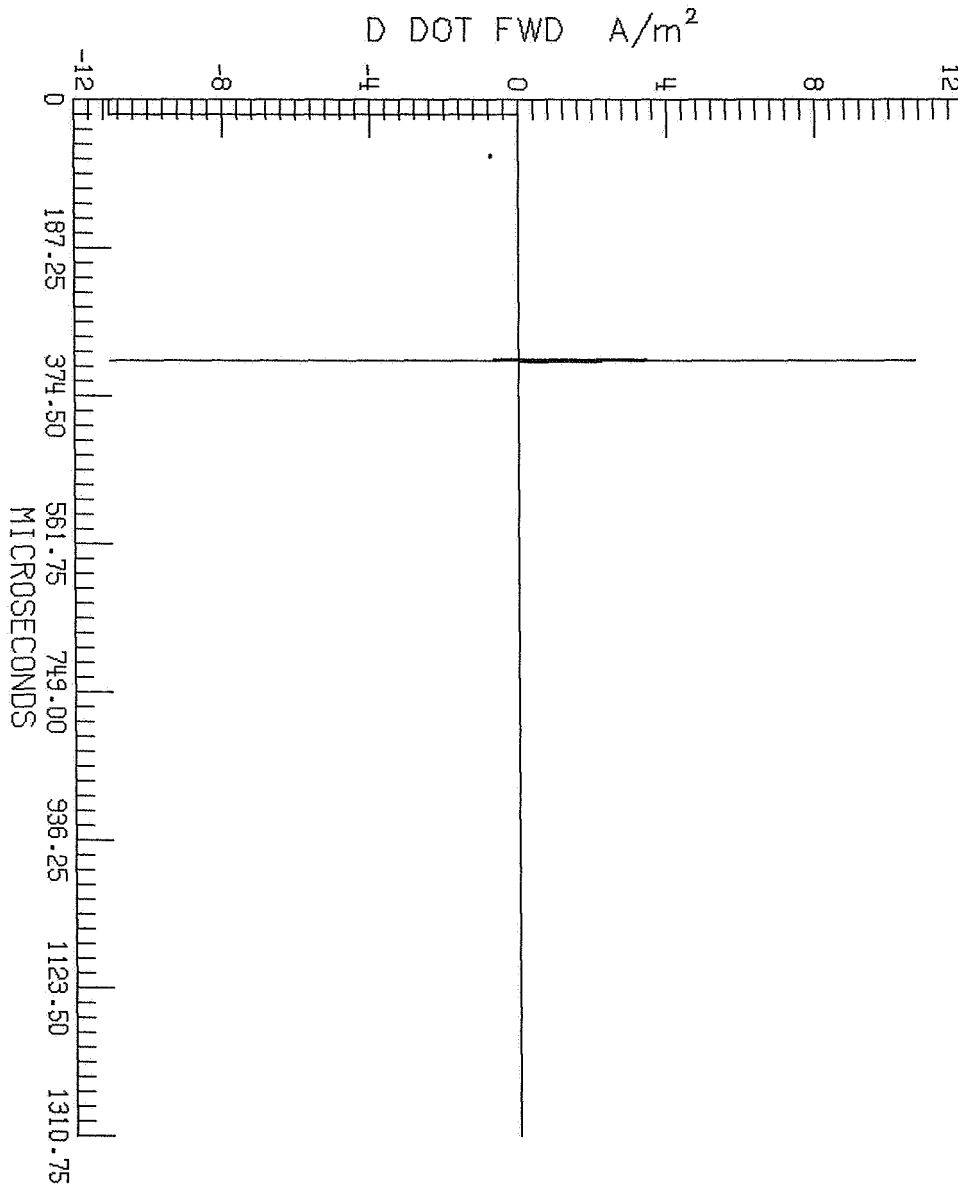


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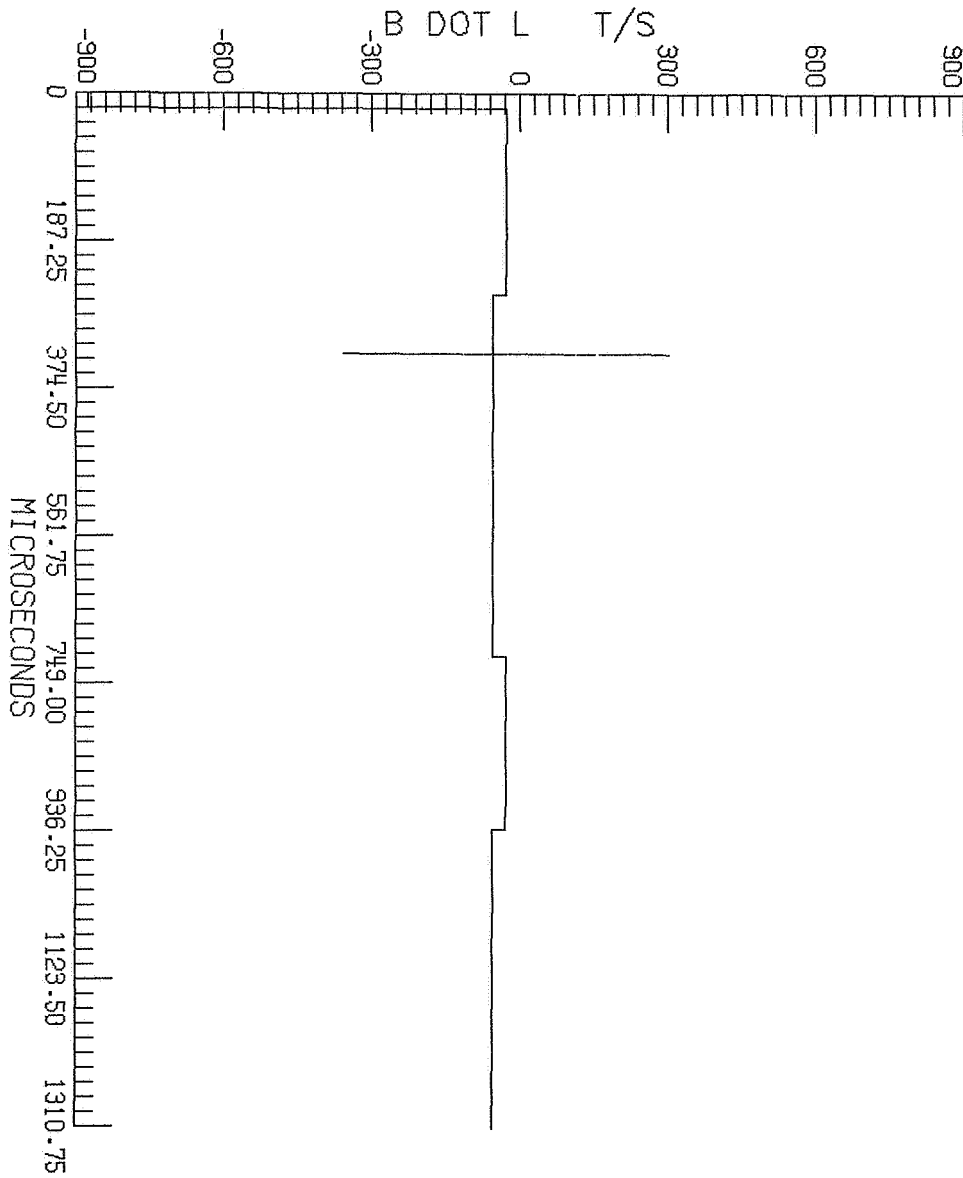


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TEST NO. 82-038

RUN NO. 8



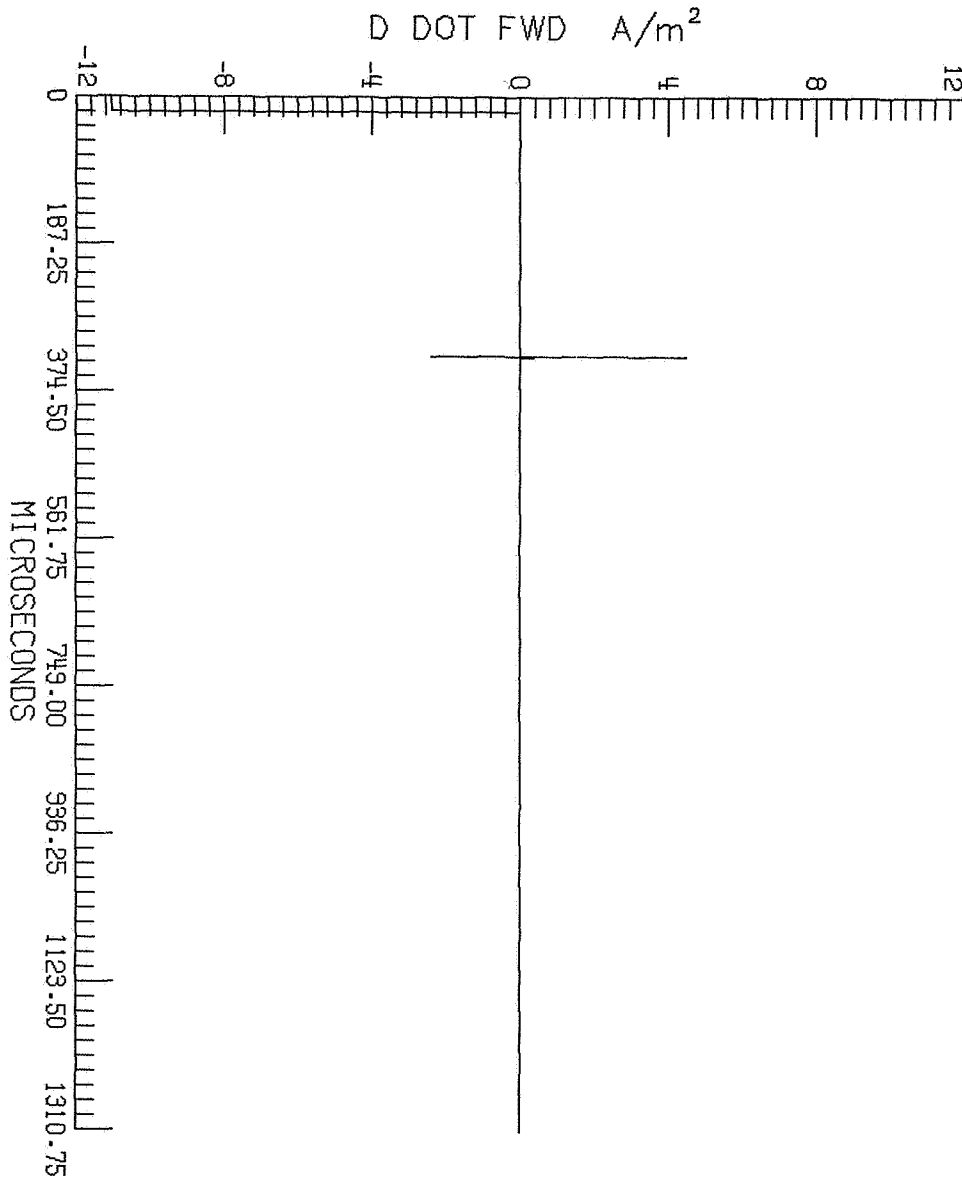
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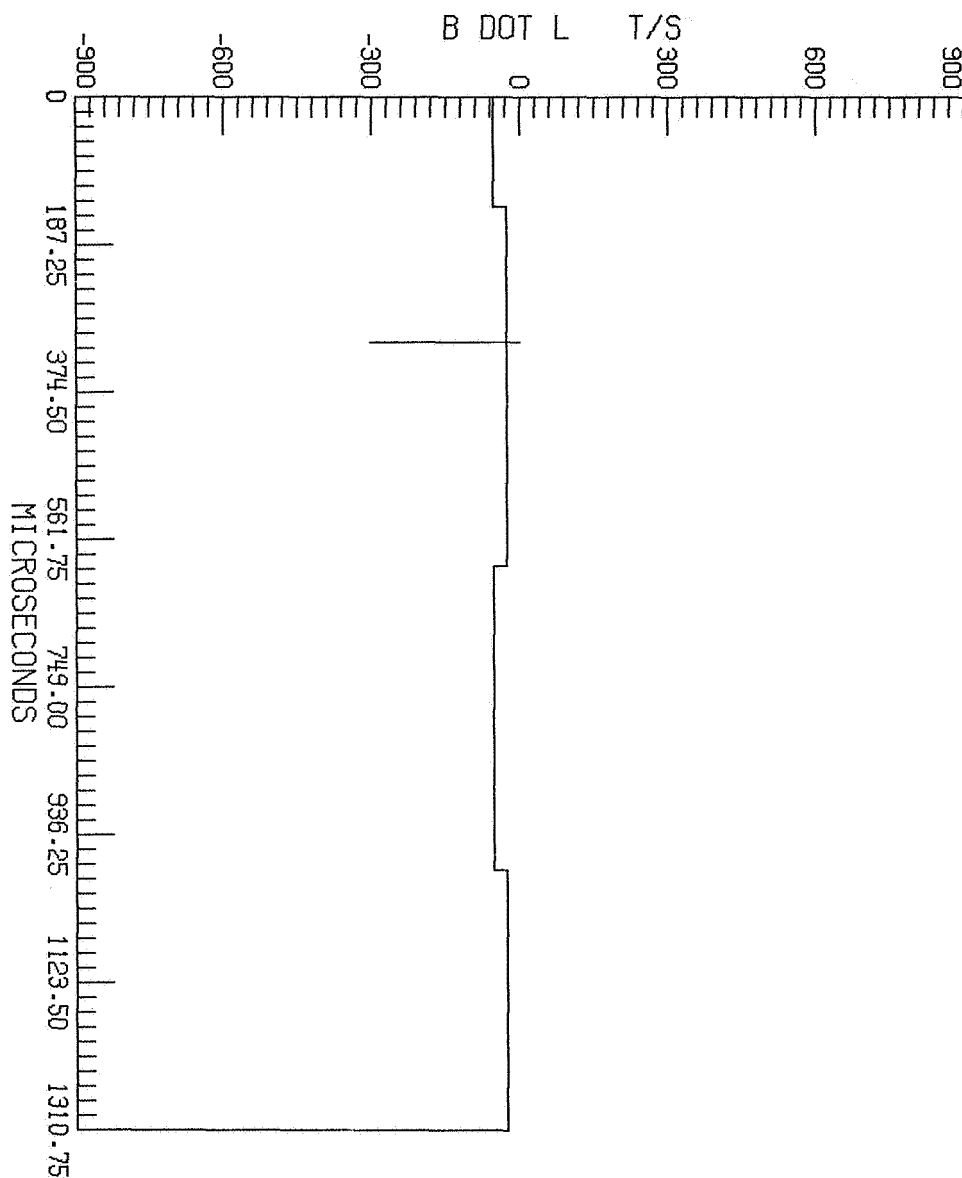


C.2

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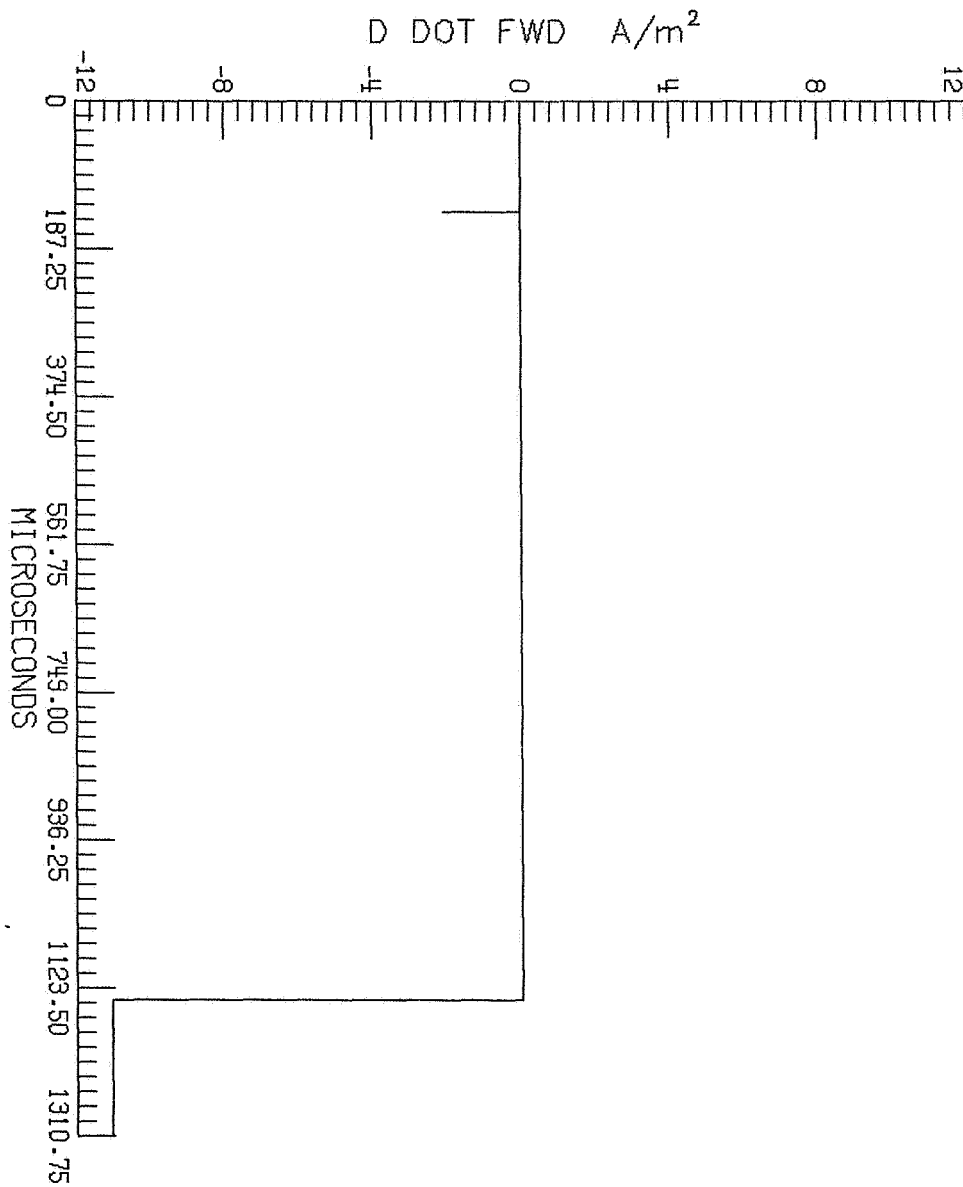
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F106 LIGHTNING/TK10/M.THOMAS

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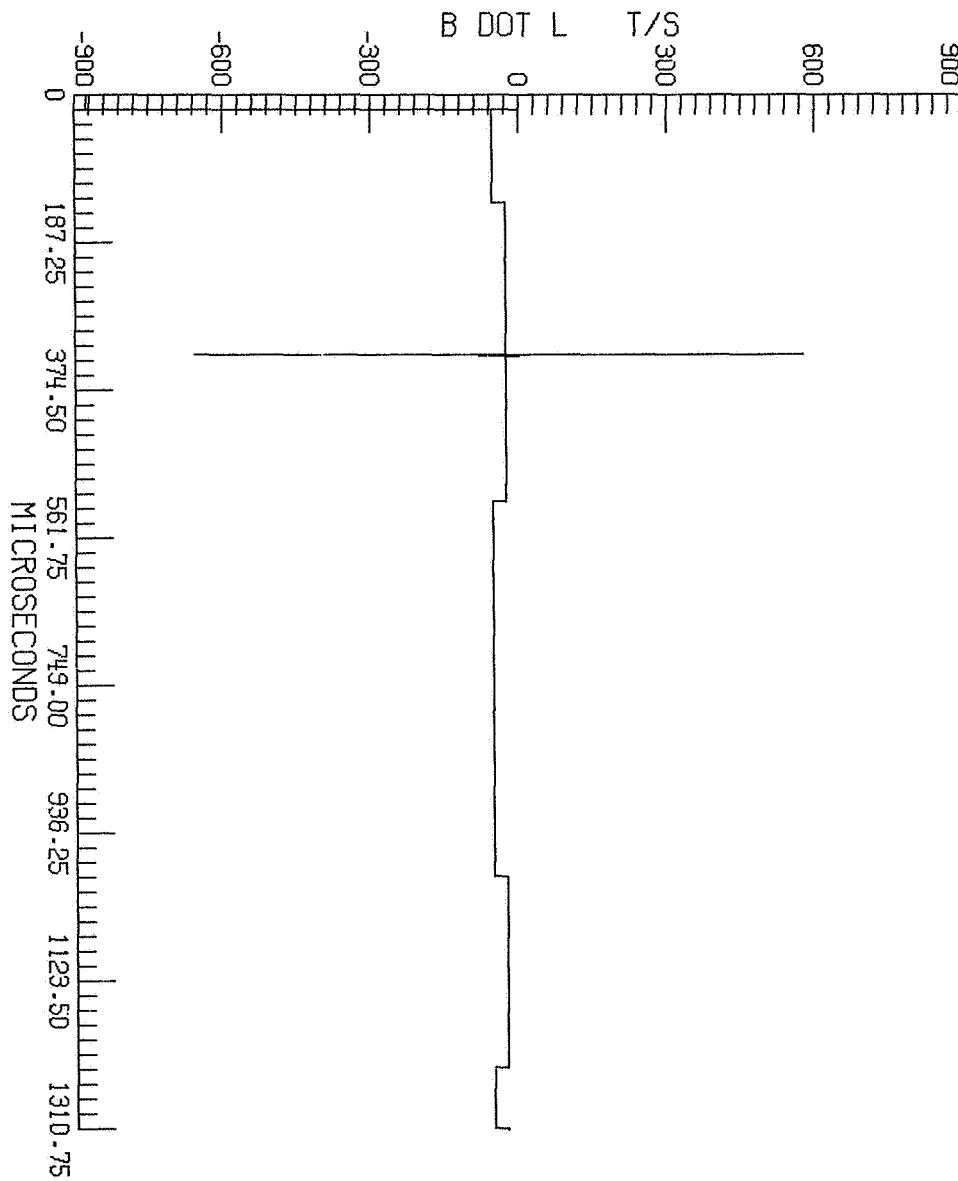


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F106 LIGHTNING/TK8/M.THOMAS

TEST NO. 039

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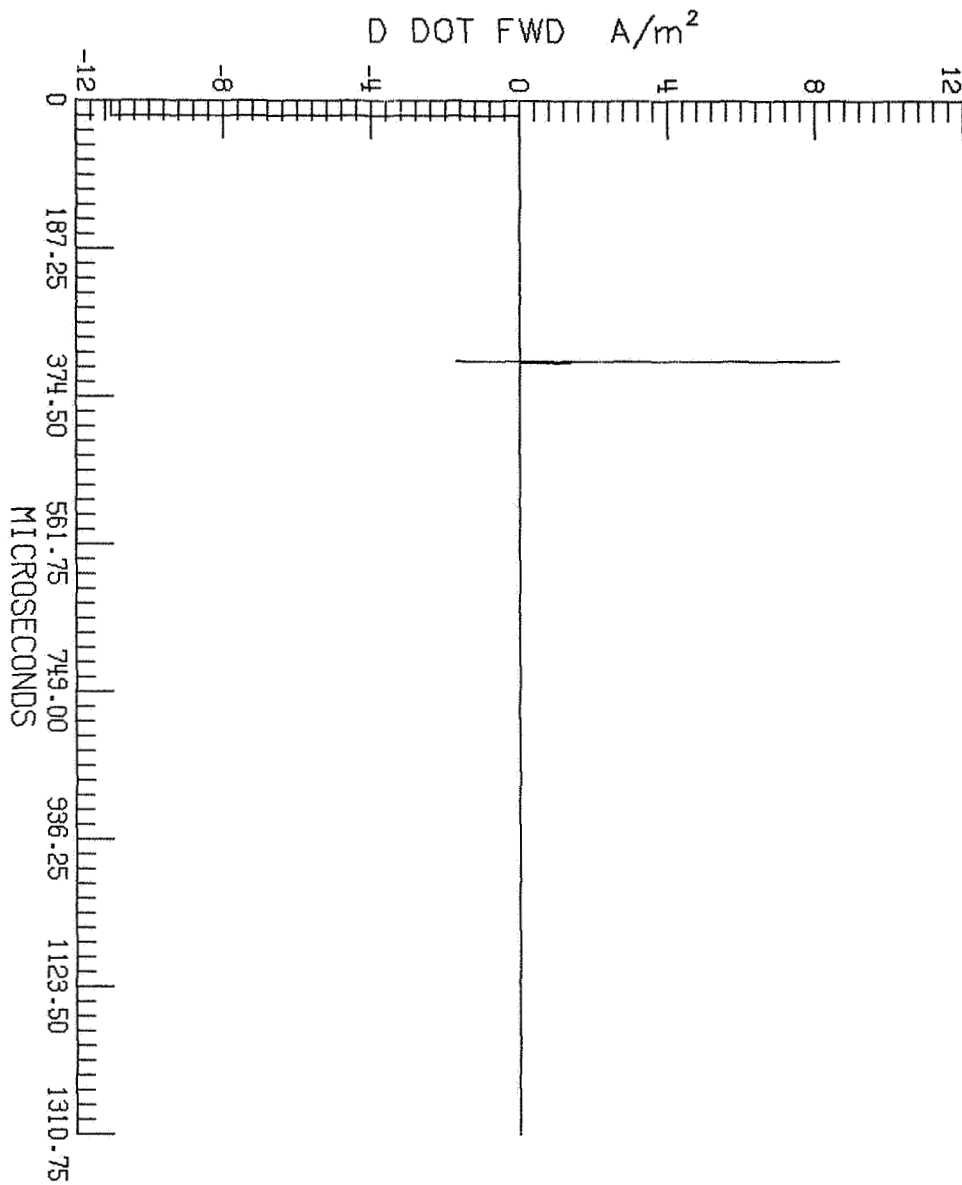


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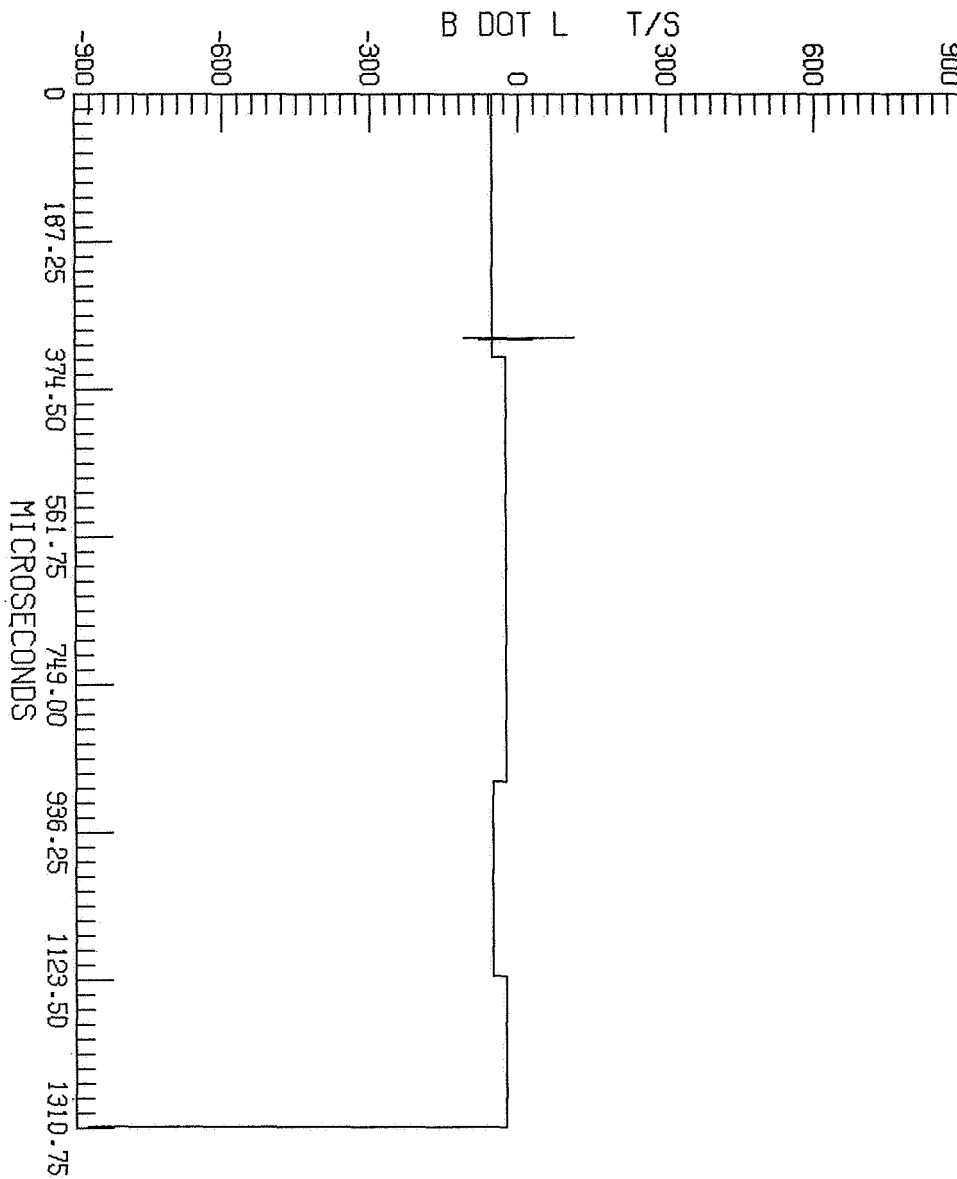
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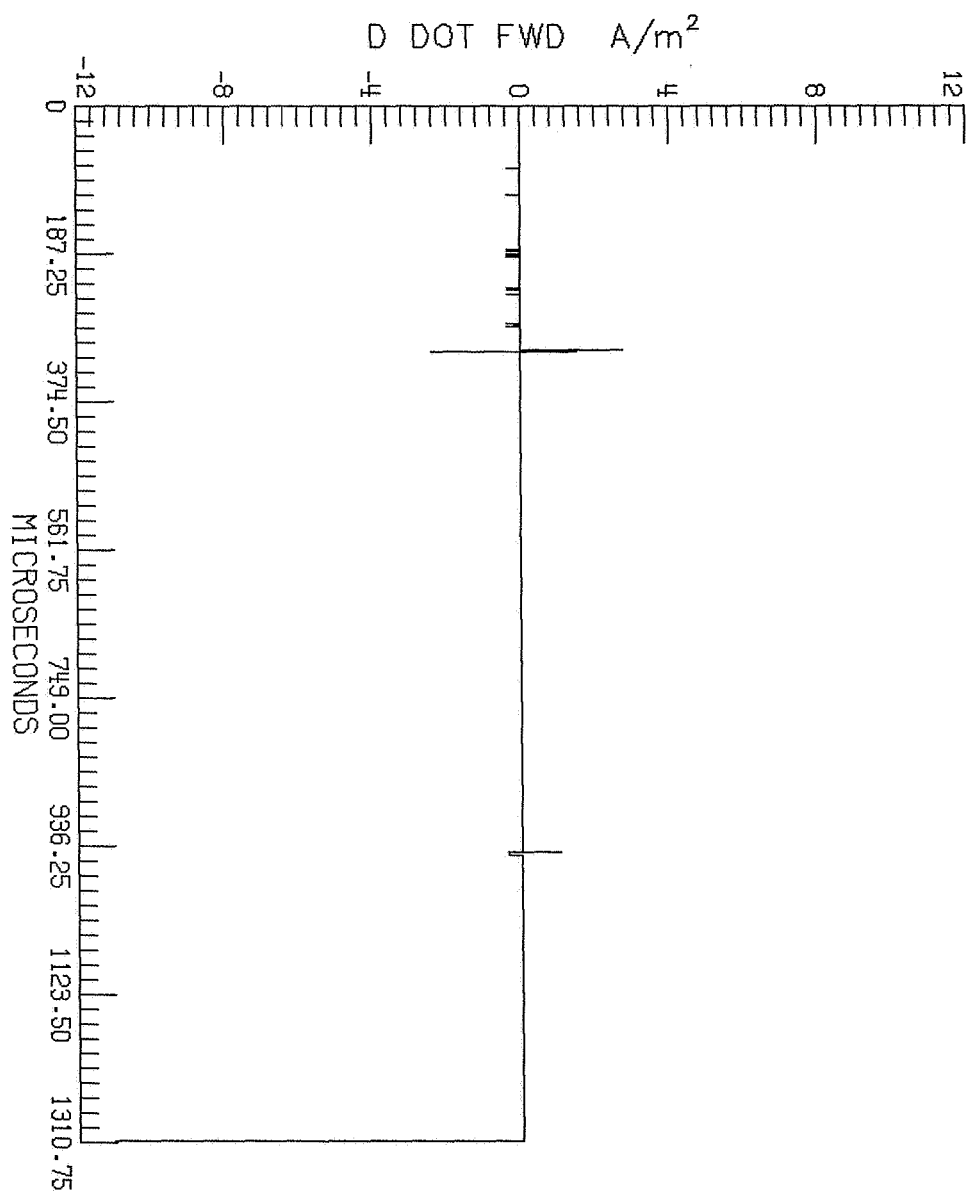
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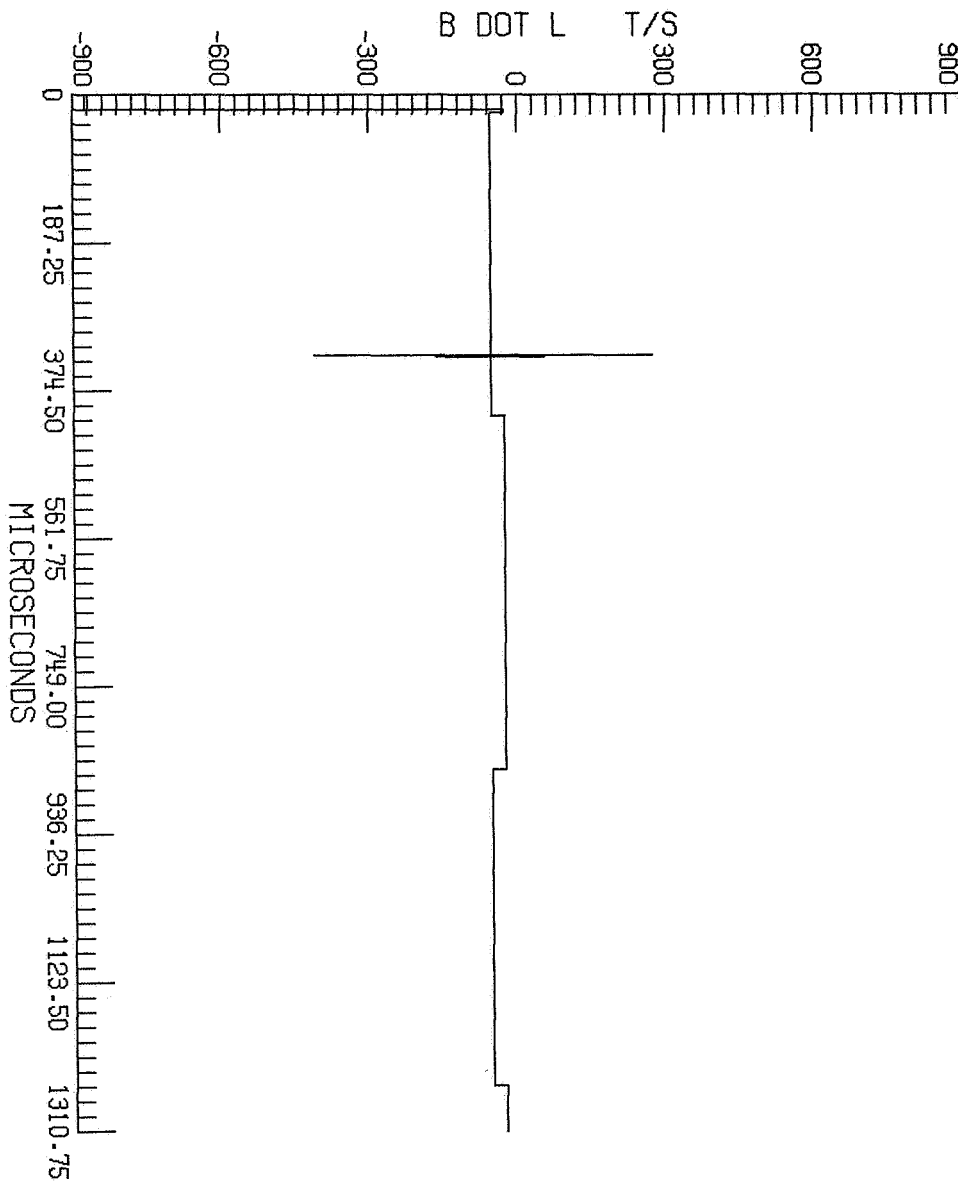
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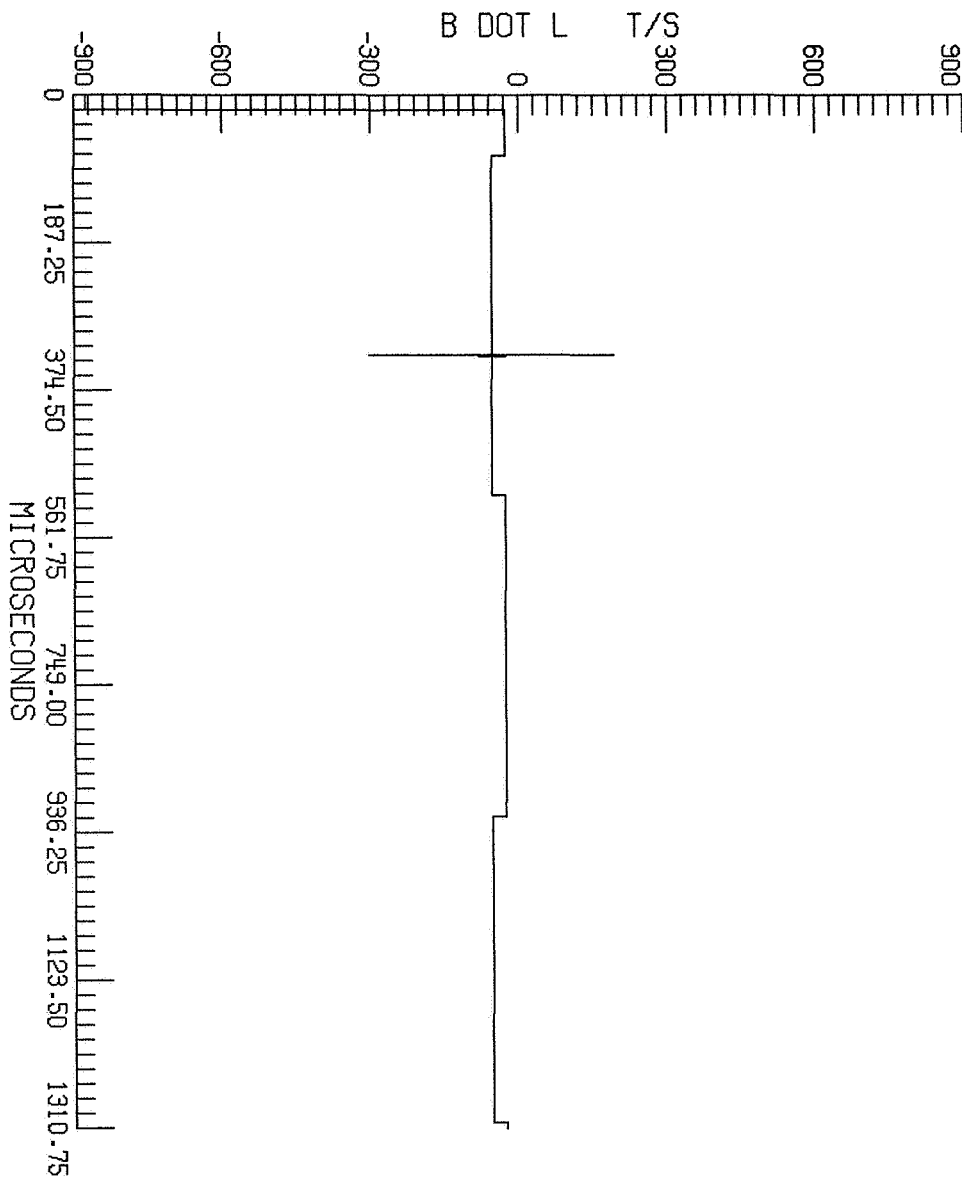


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TEST NO. 040

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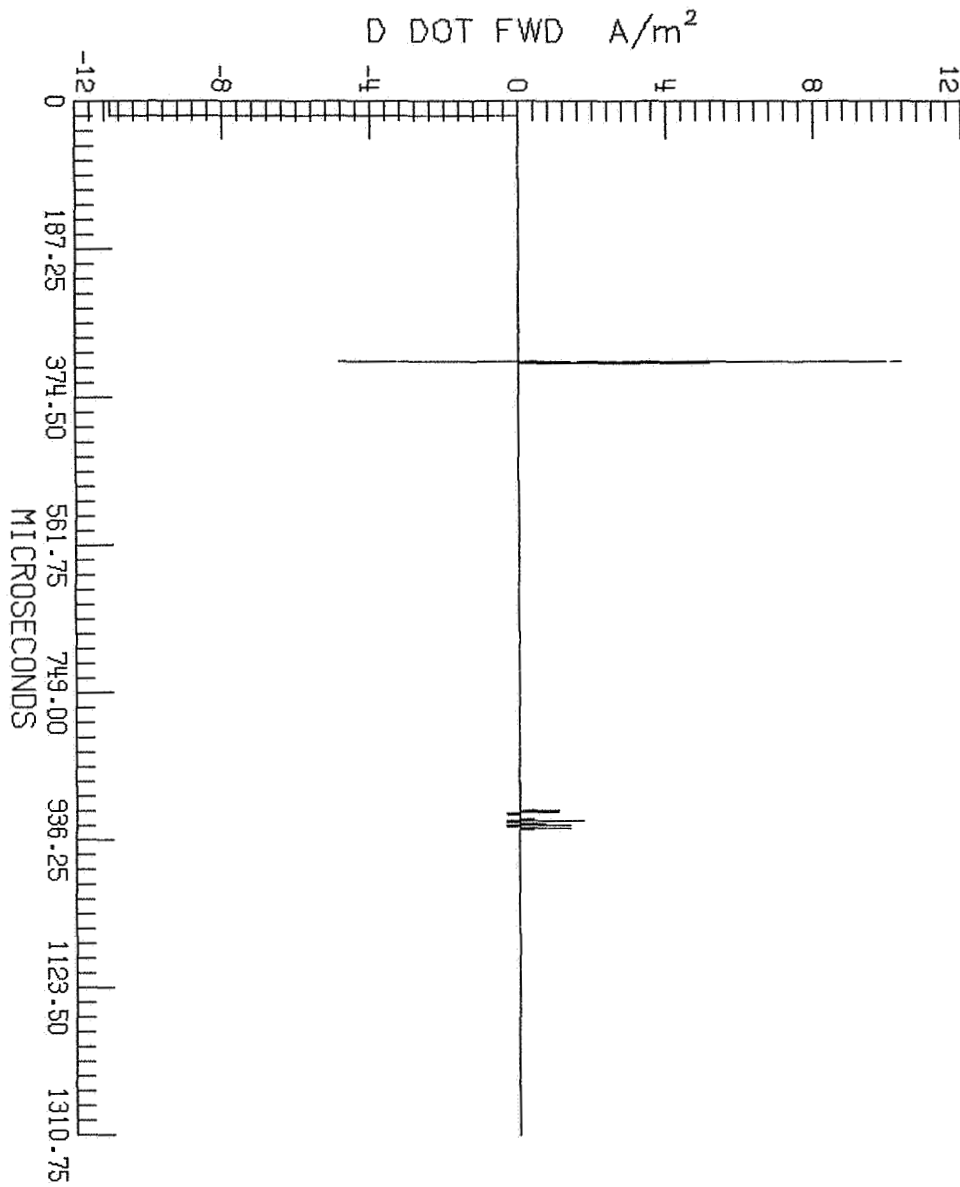


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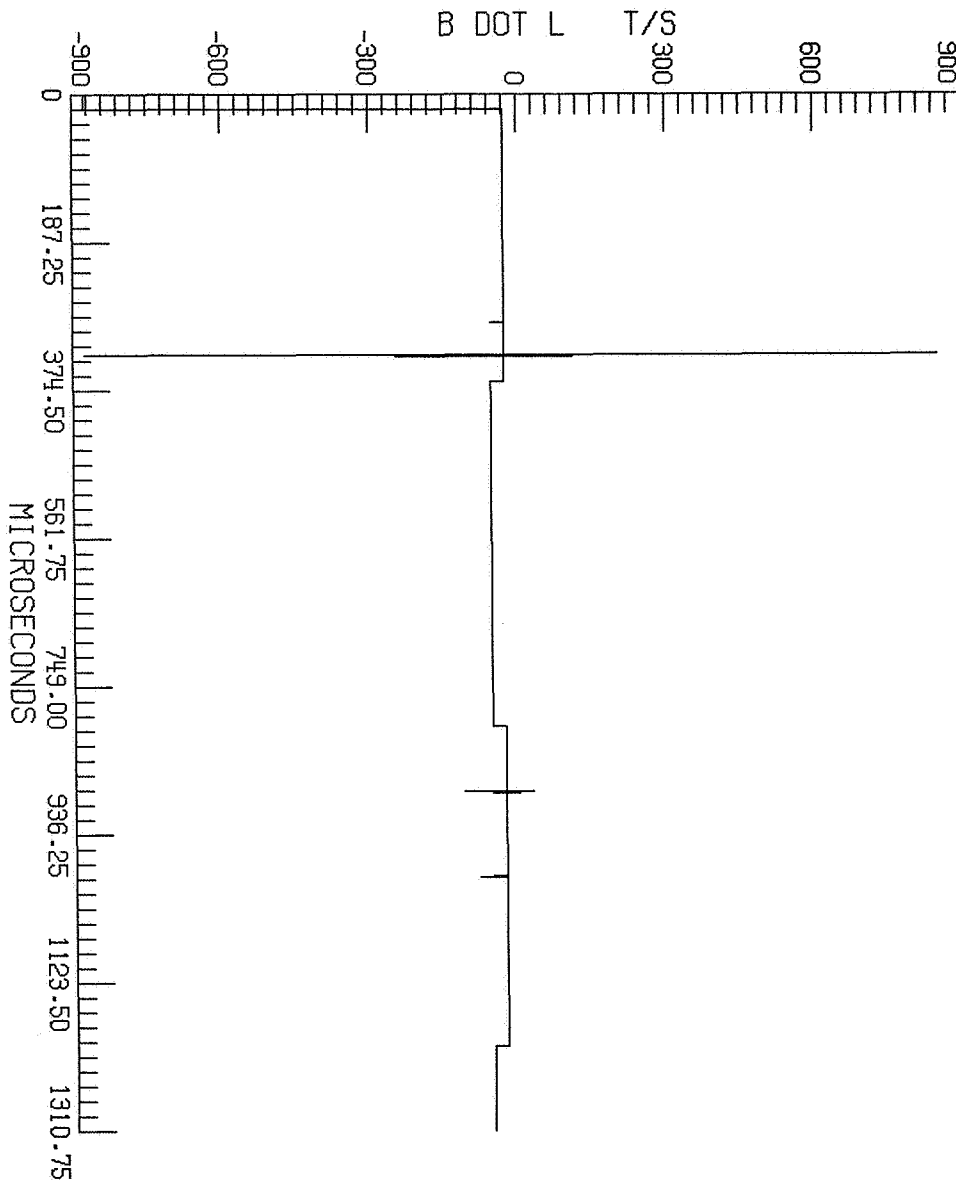


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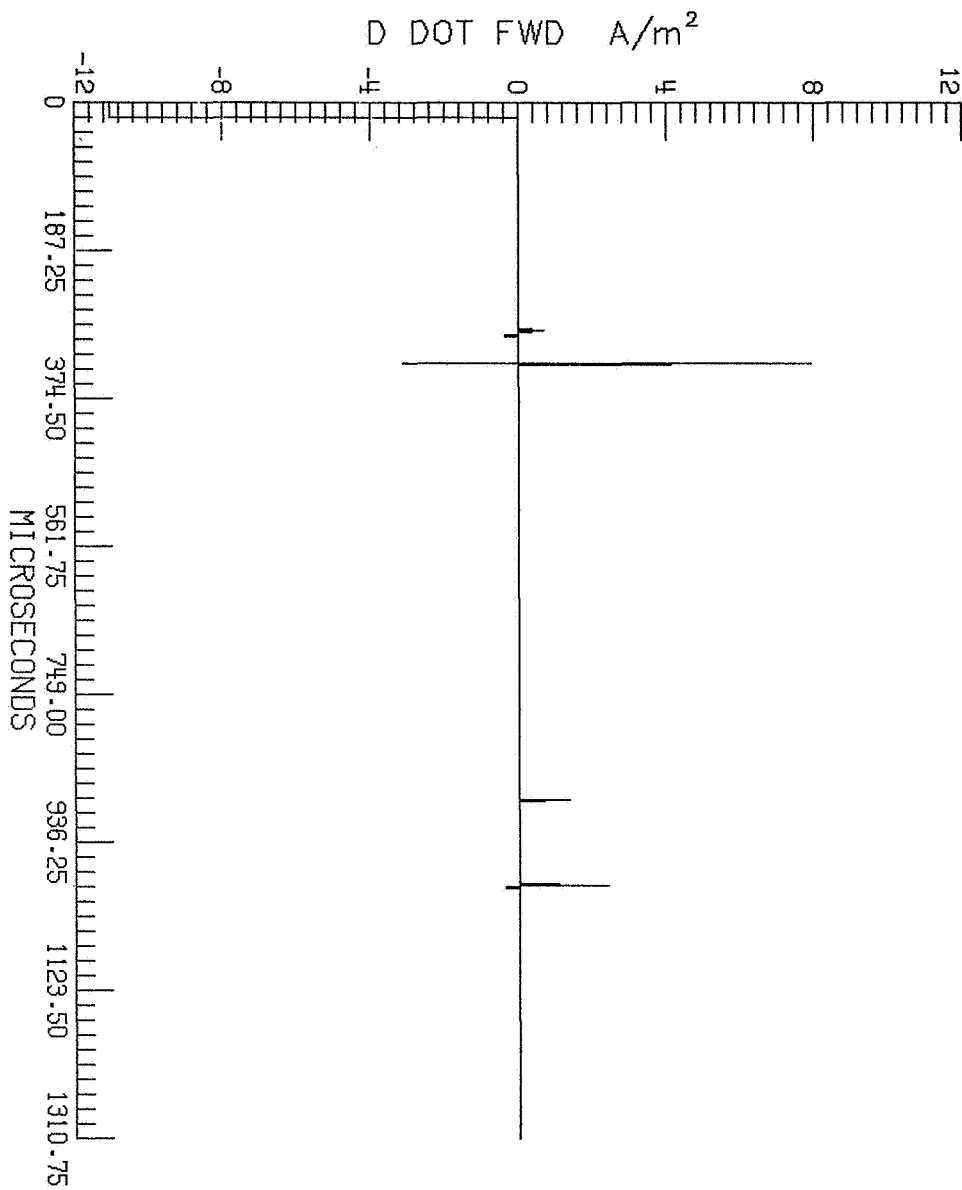
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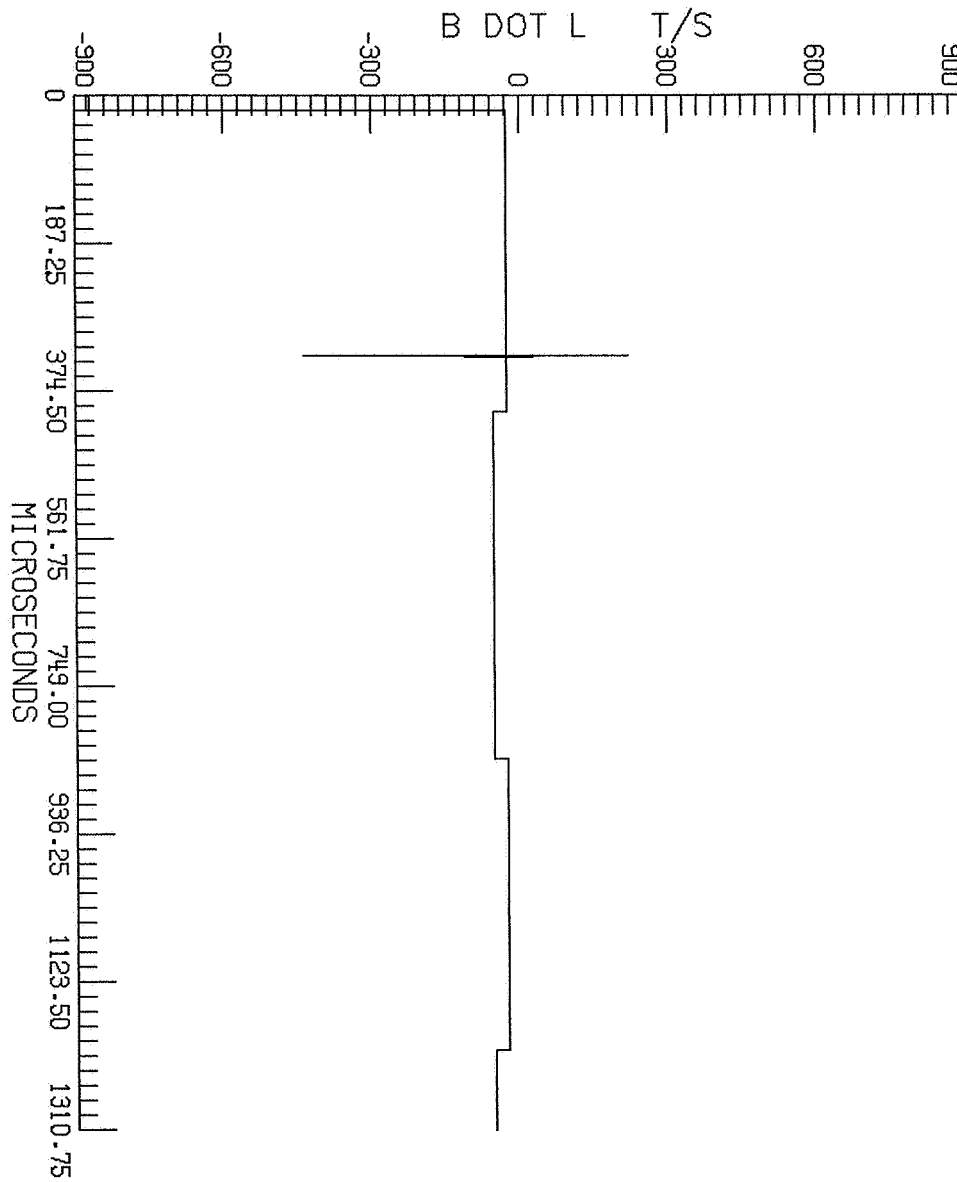


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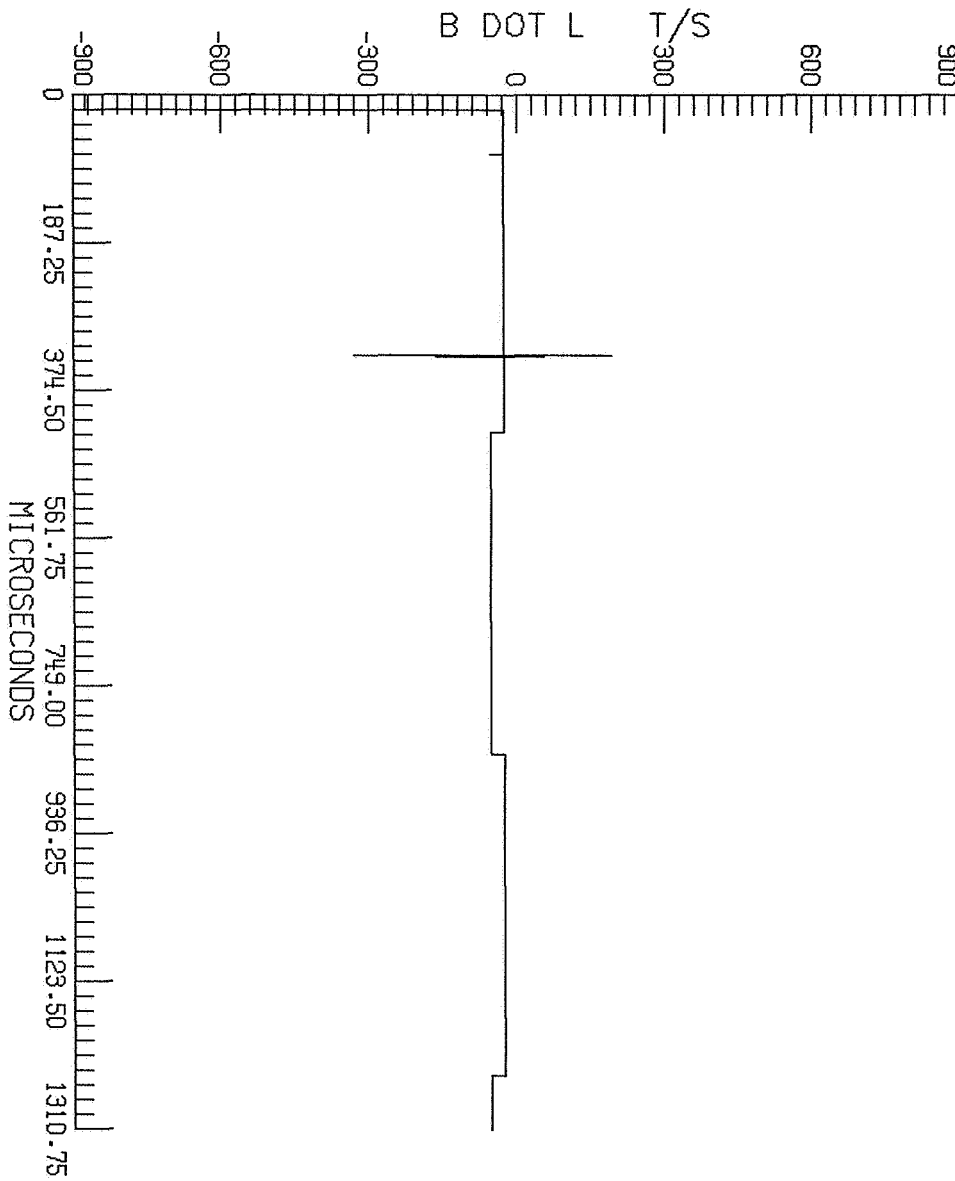
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F106 LIGHTNING/TK8/M.THOMAS

TEST NO. 040

RUN NO. 6

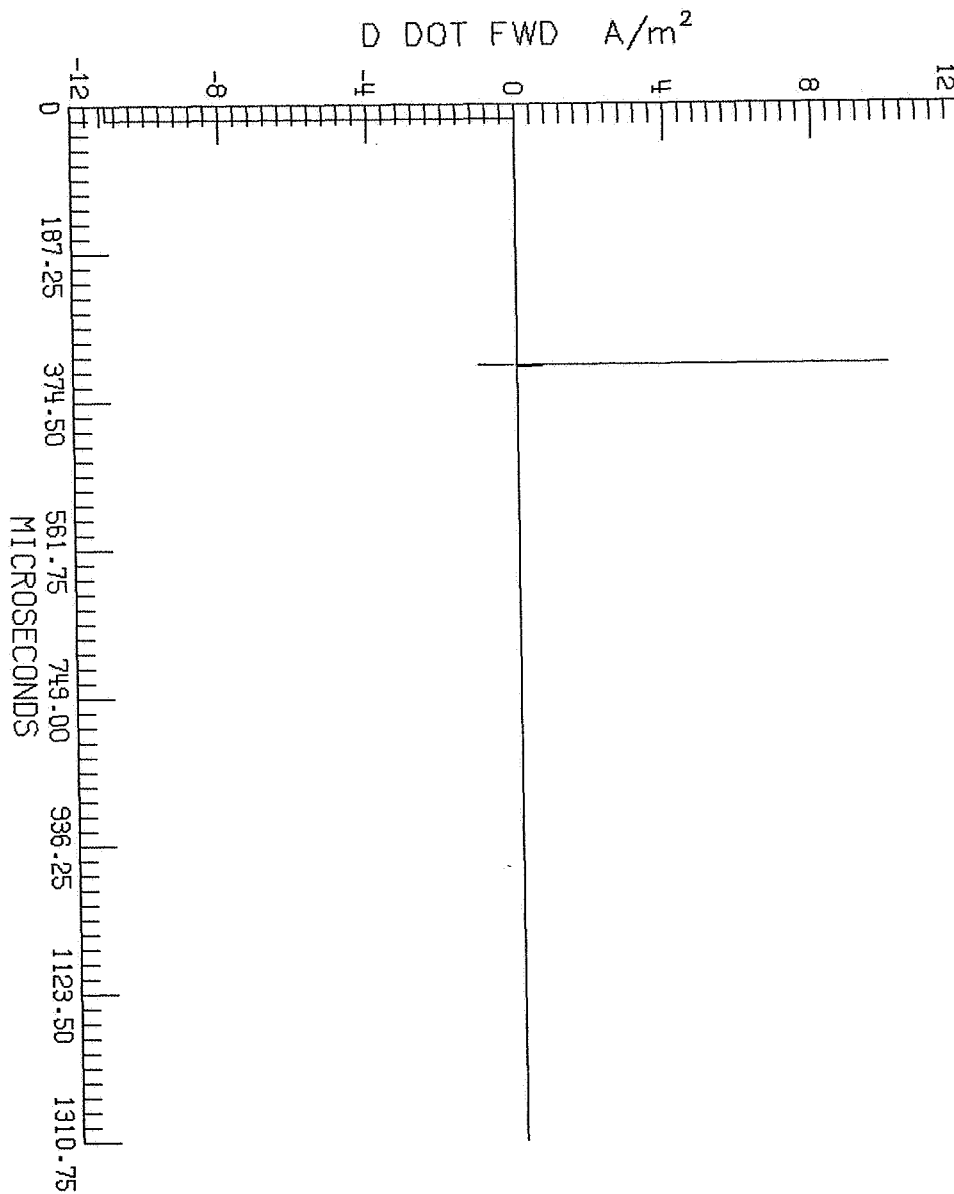


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TEST NO. 040

RUN NO. 6

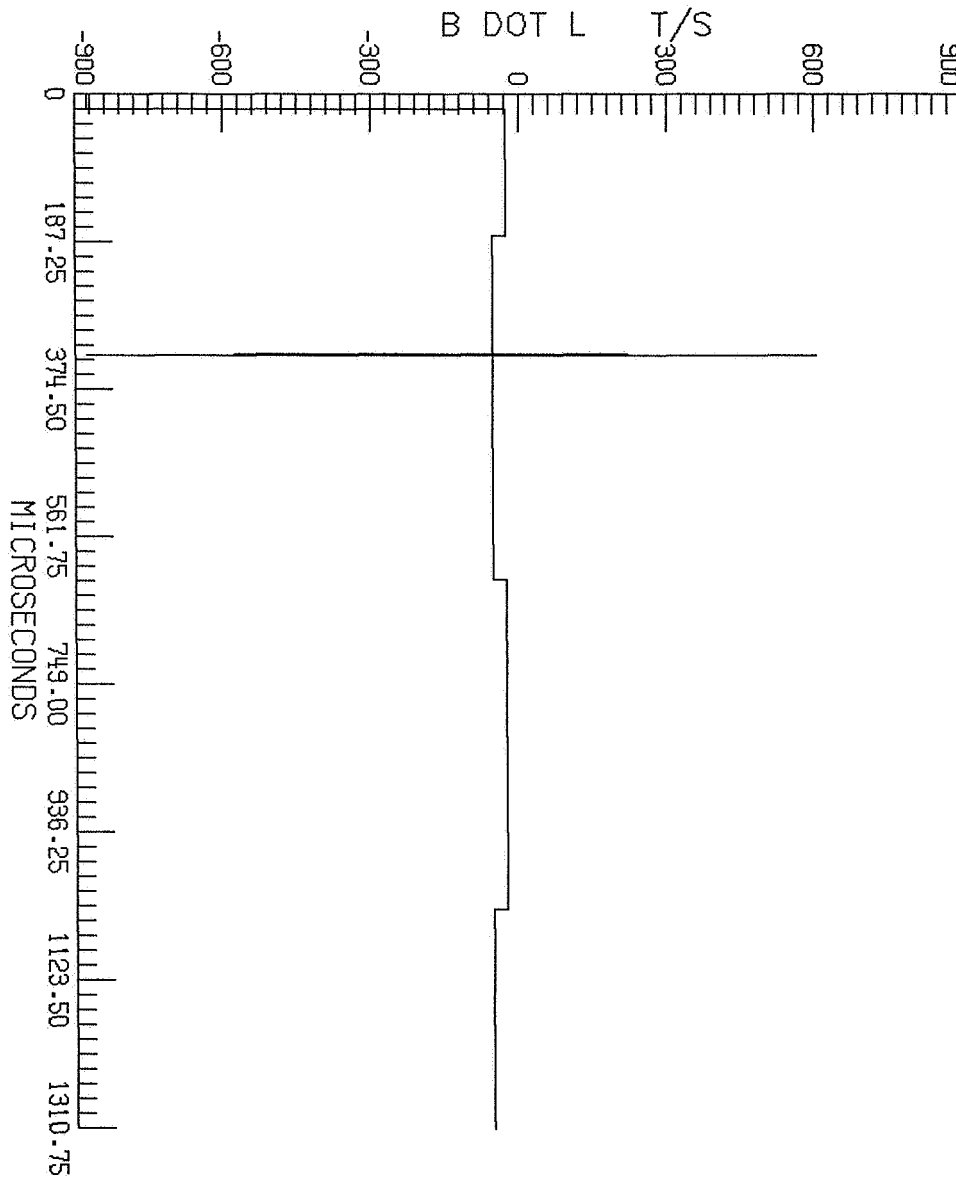


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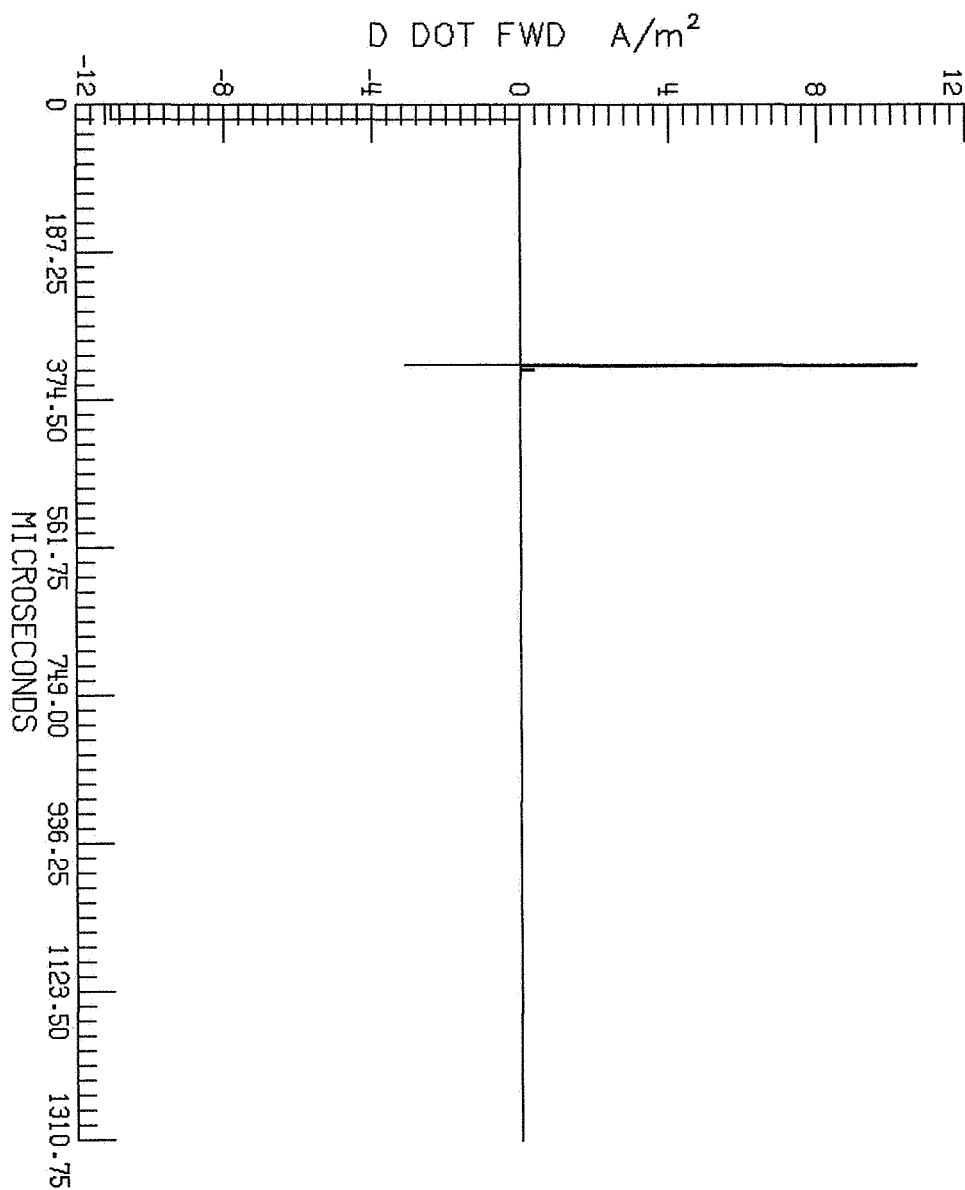
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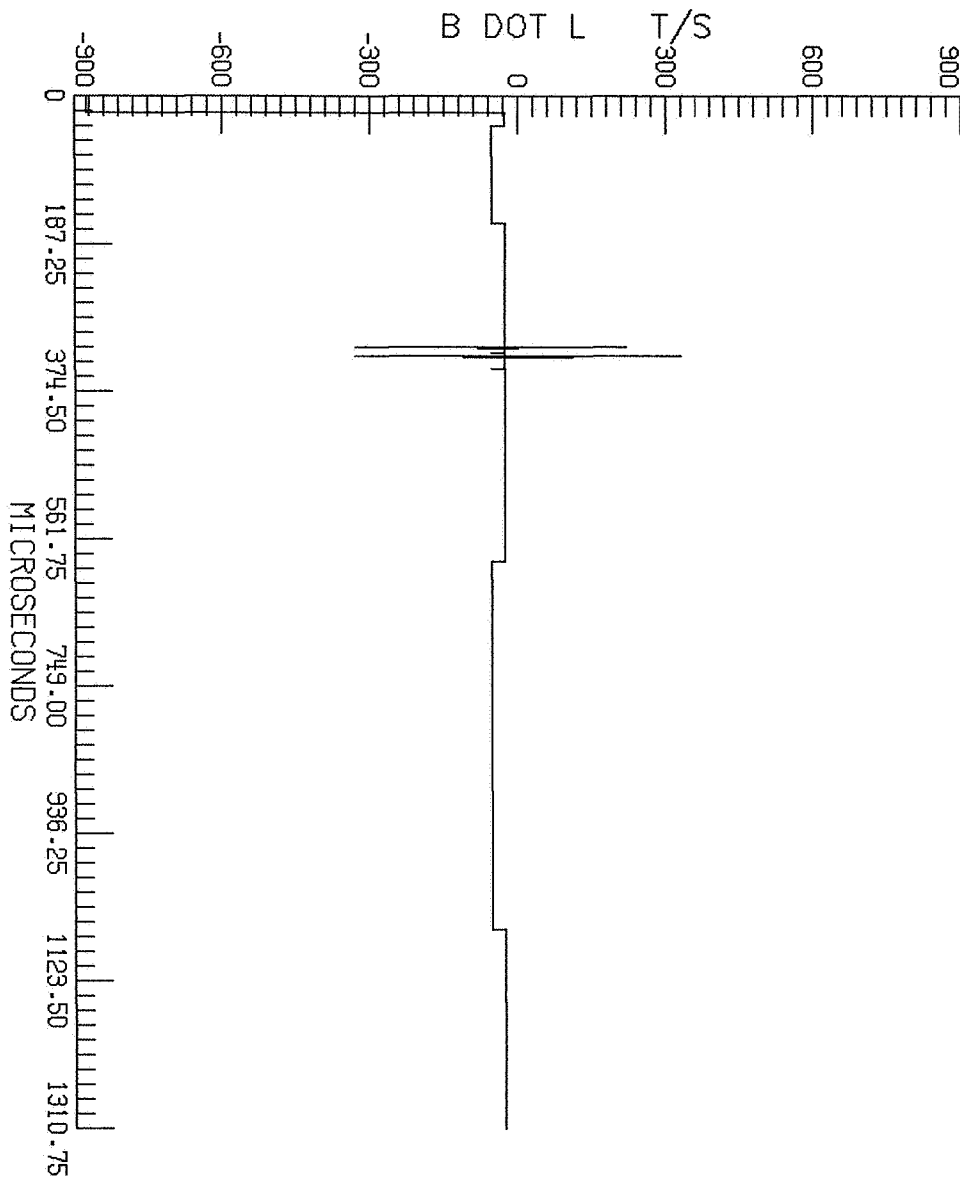


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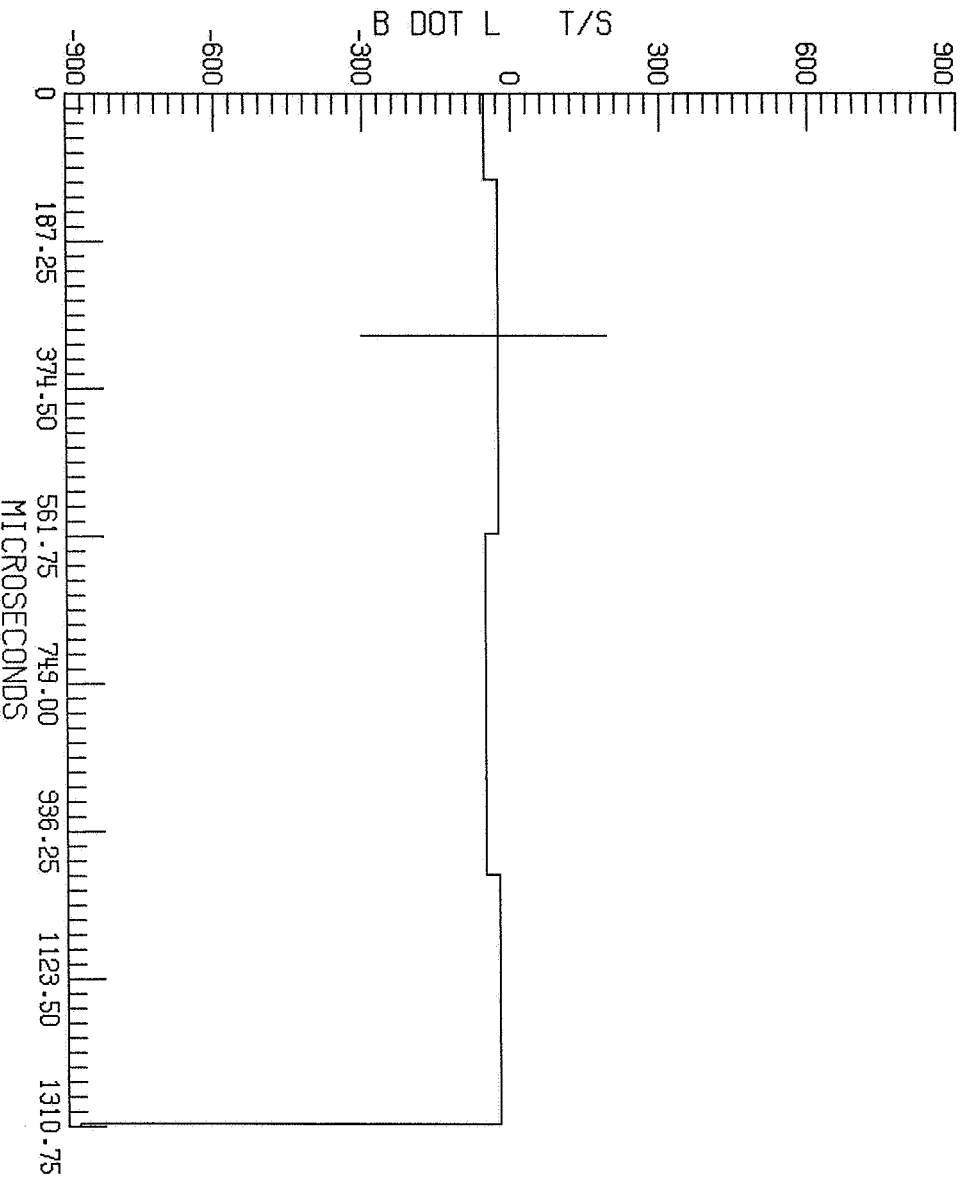


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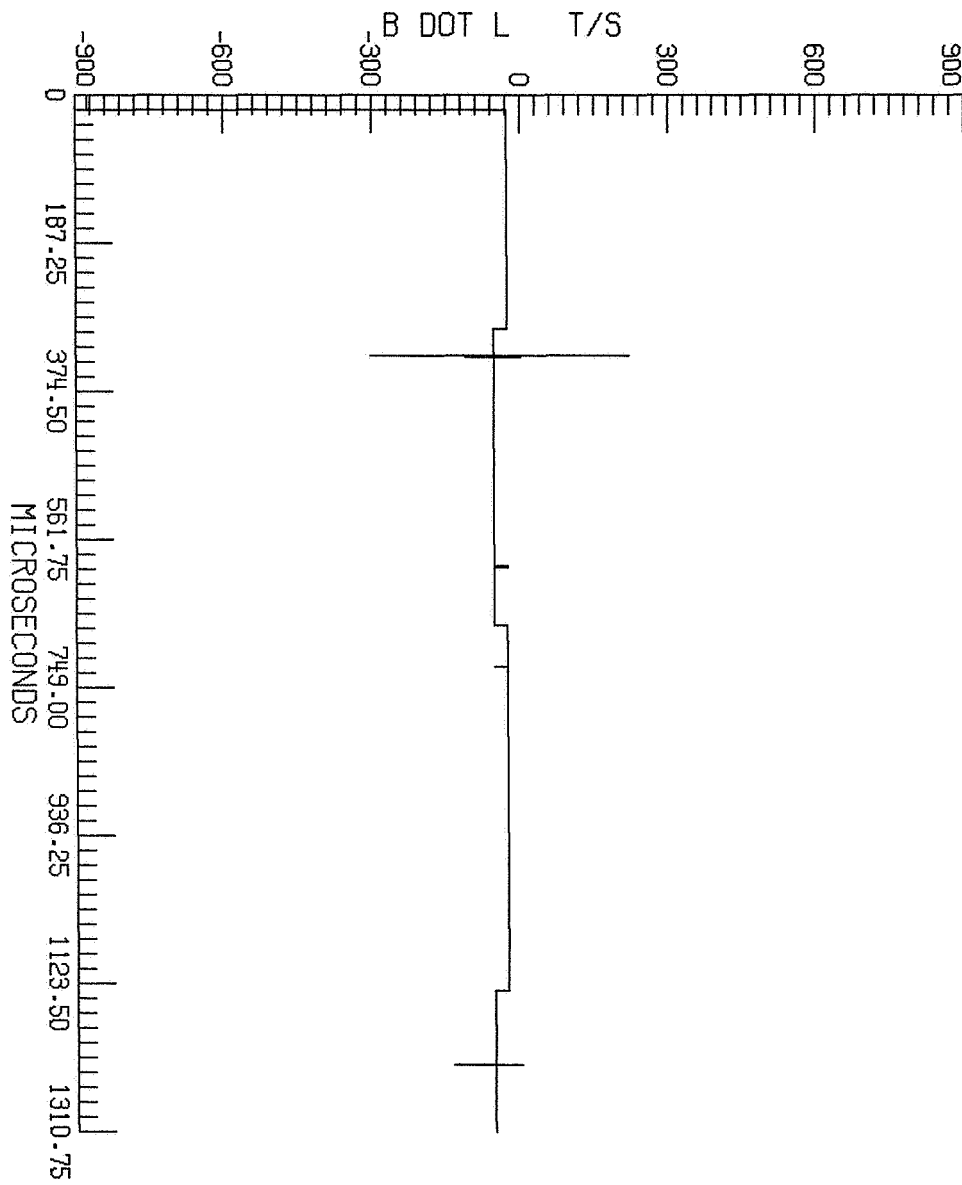


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TEST NO. 82-041

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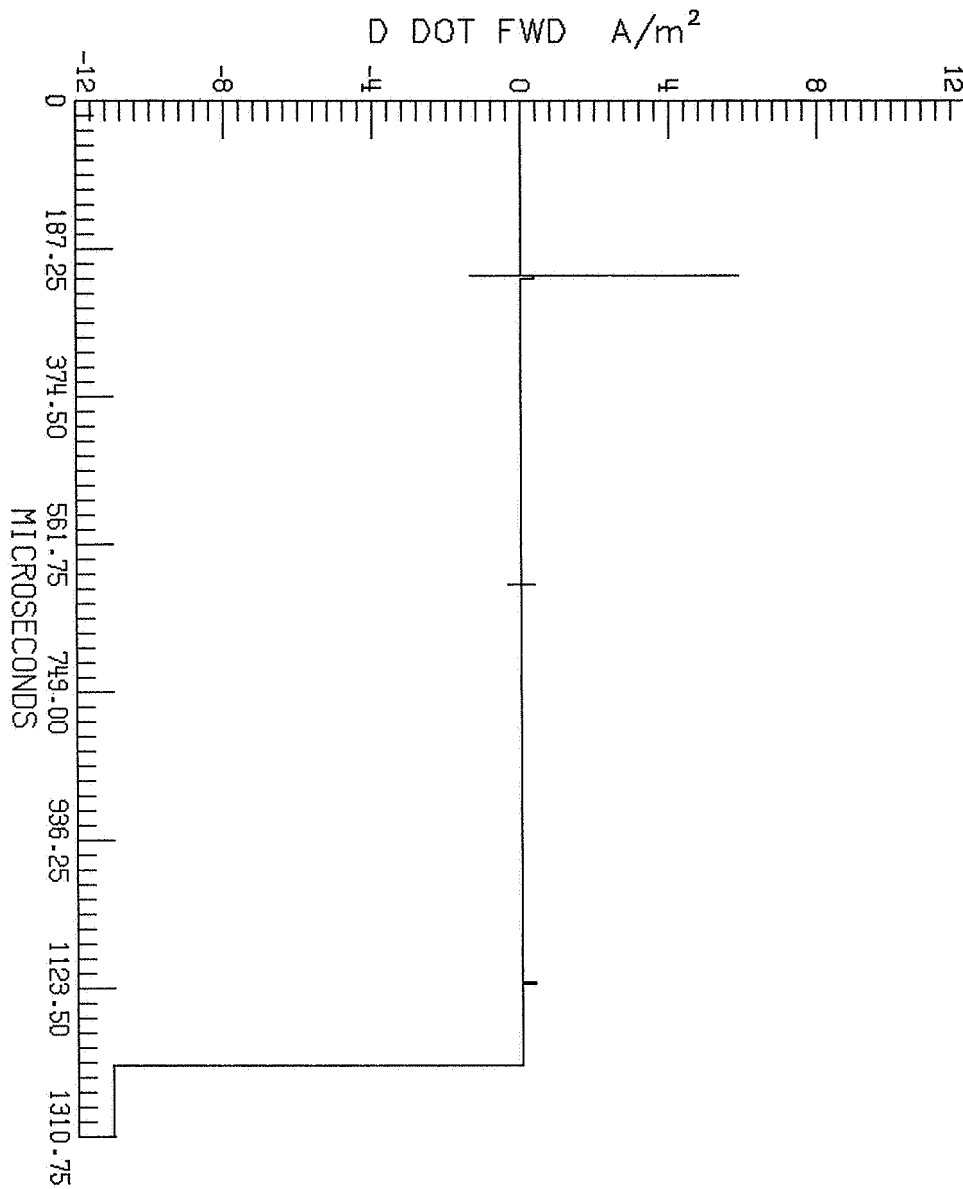


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TEST NO. 82-041

RUN NO. 2

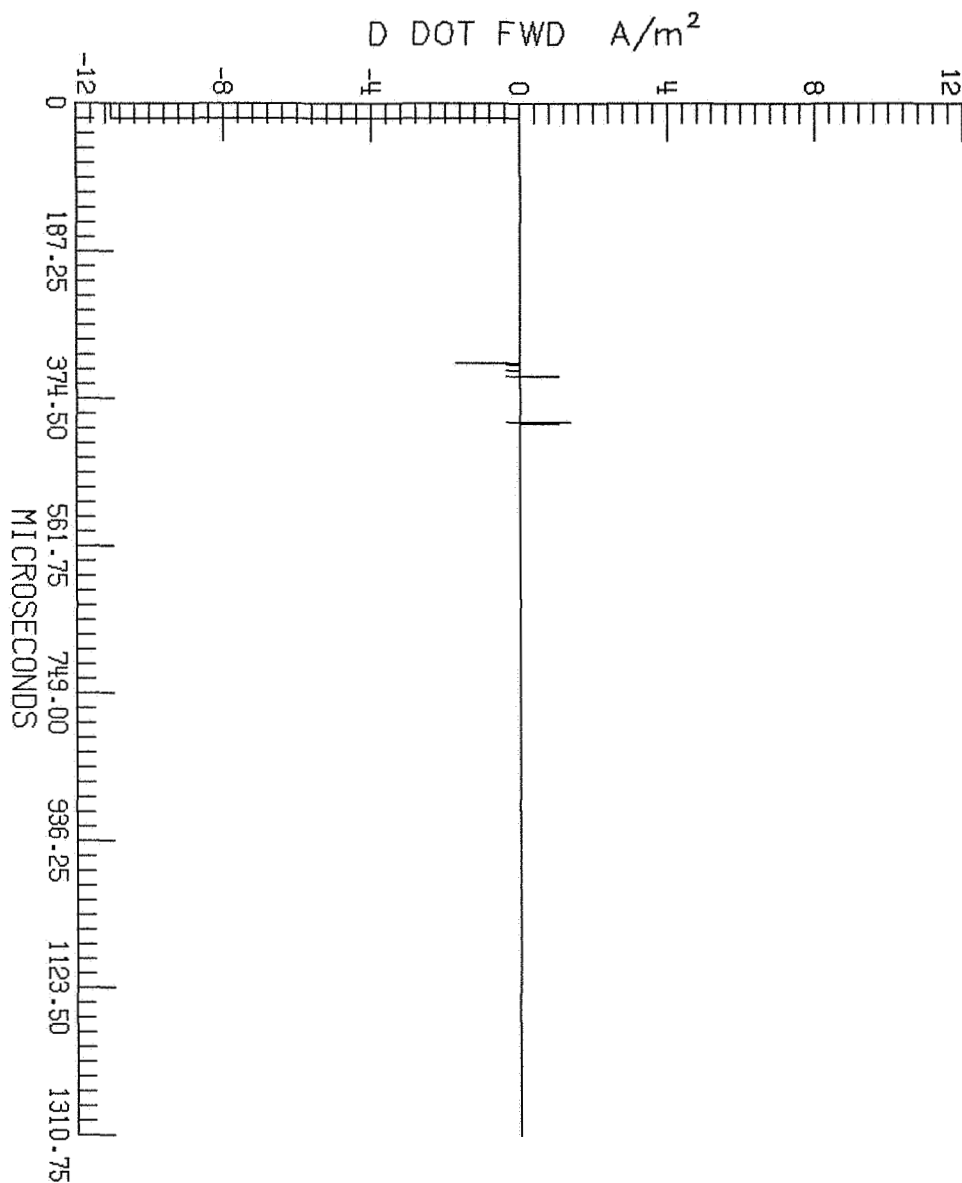


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F106 LIGHTNING/TK10/THOMAS

TEST NO. 82-041

RUN NO. 3

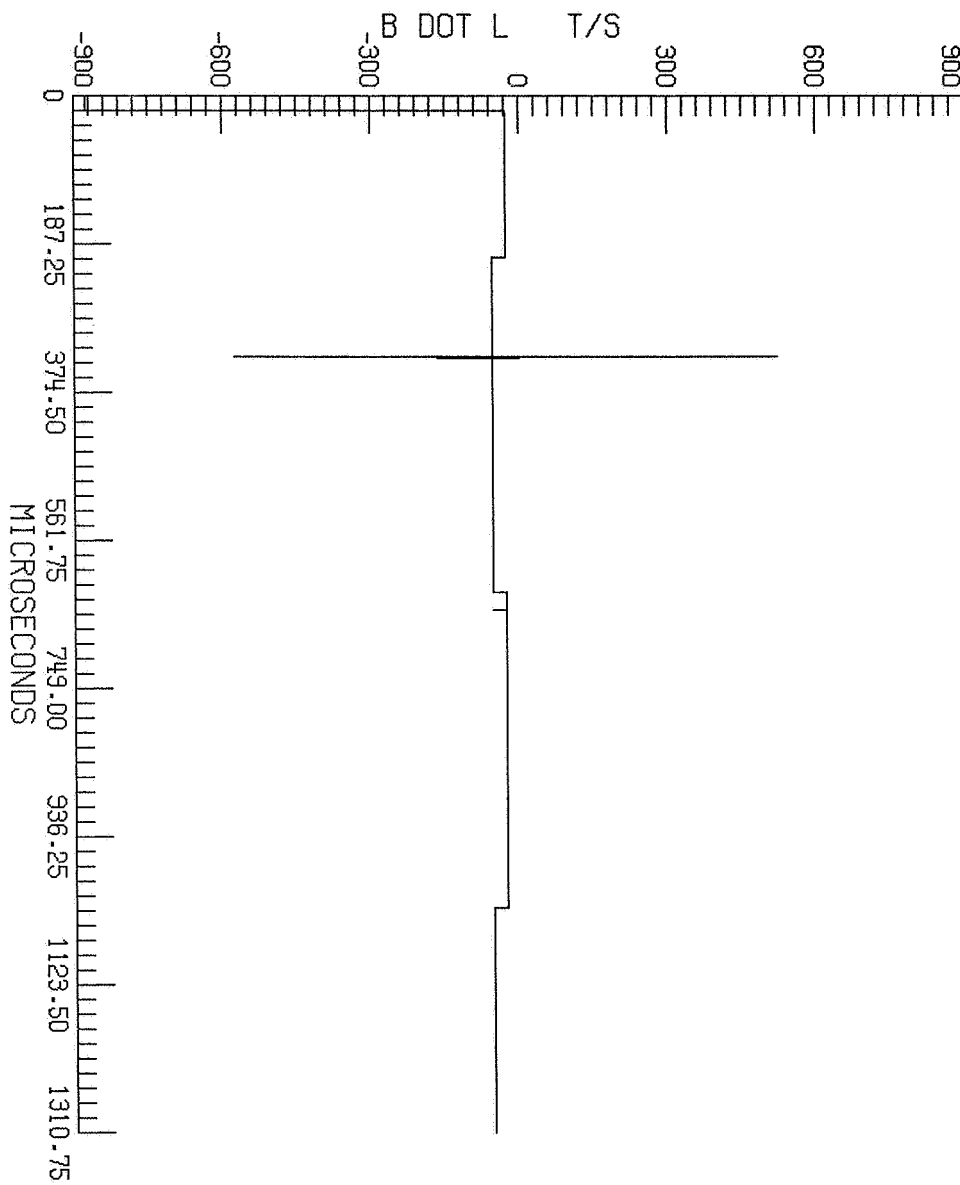


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F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-041

RUN NO. 4

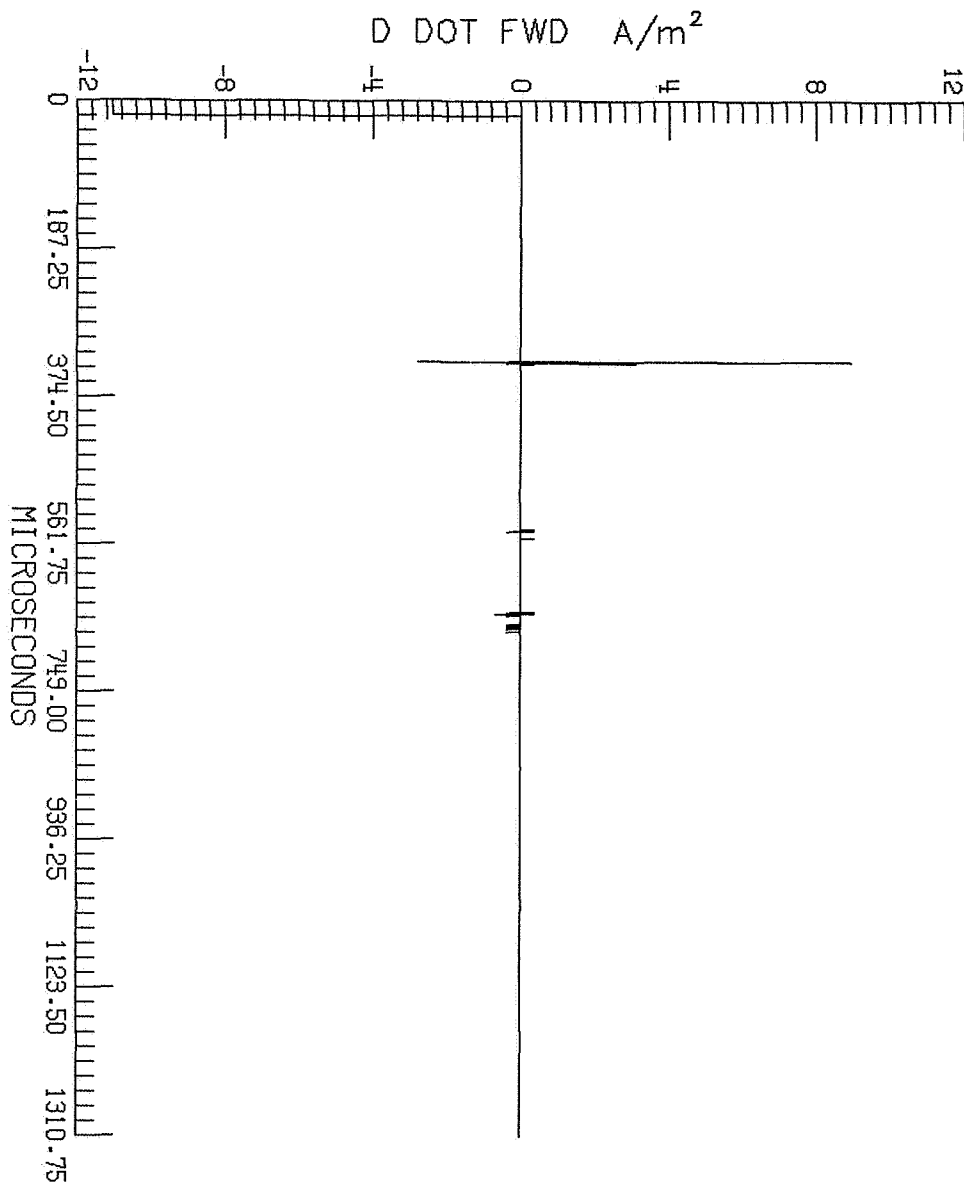


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TEST NO. 82-041

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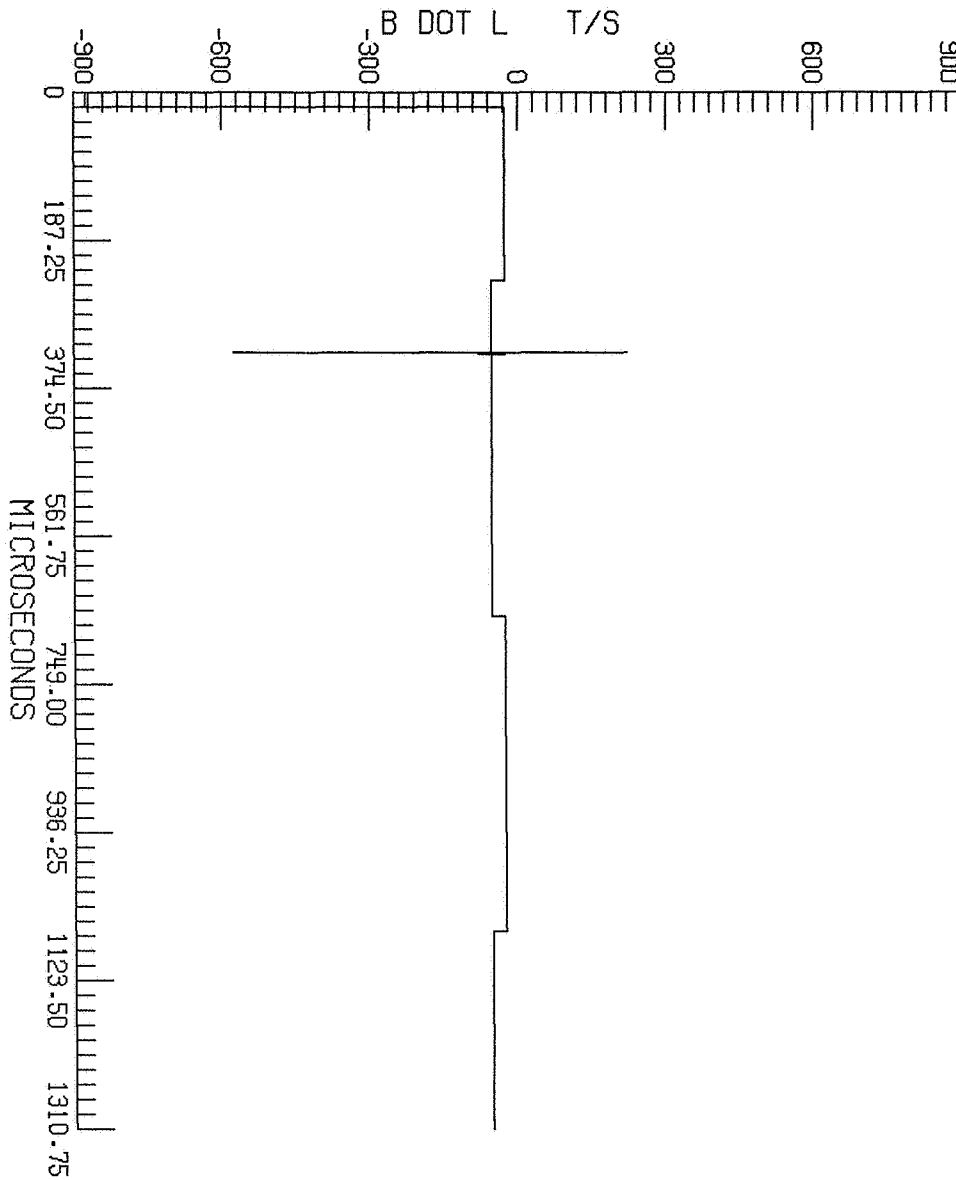


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TEST NO. 82-041

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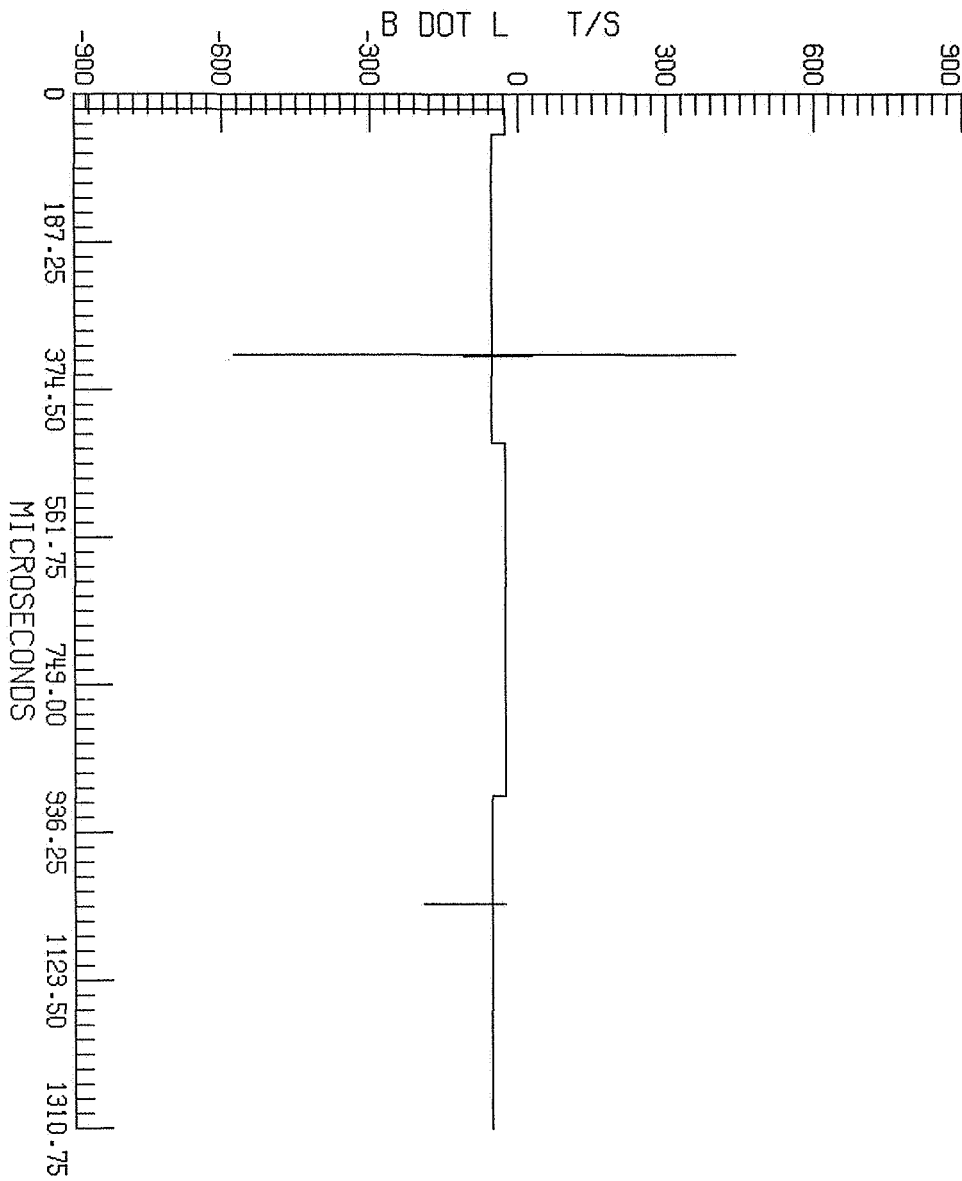


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TEST NO. 82-041

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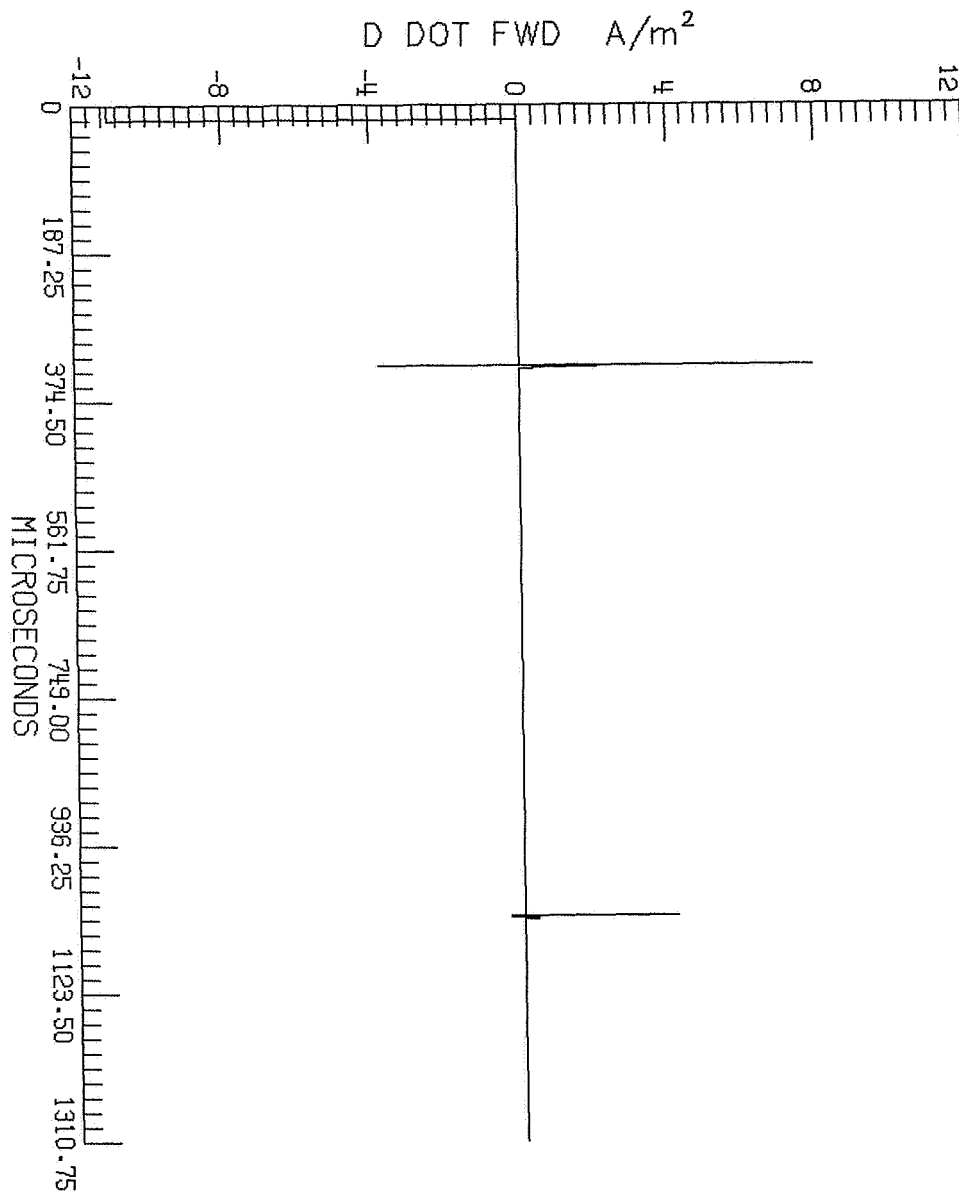


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TEST NO. 82-041

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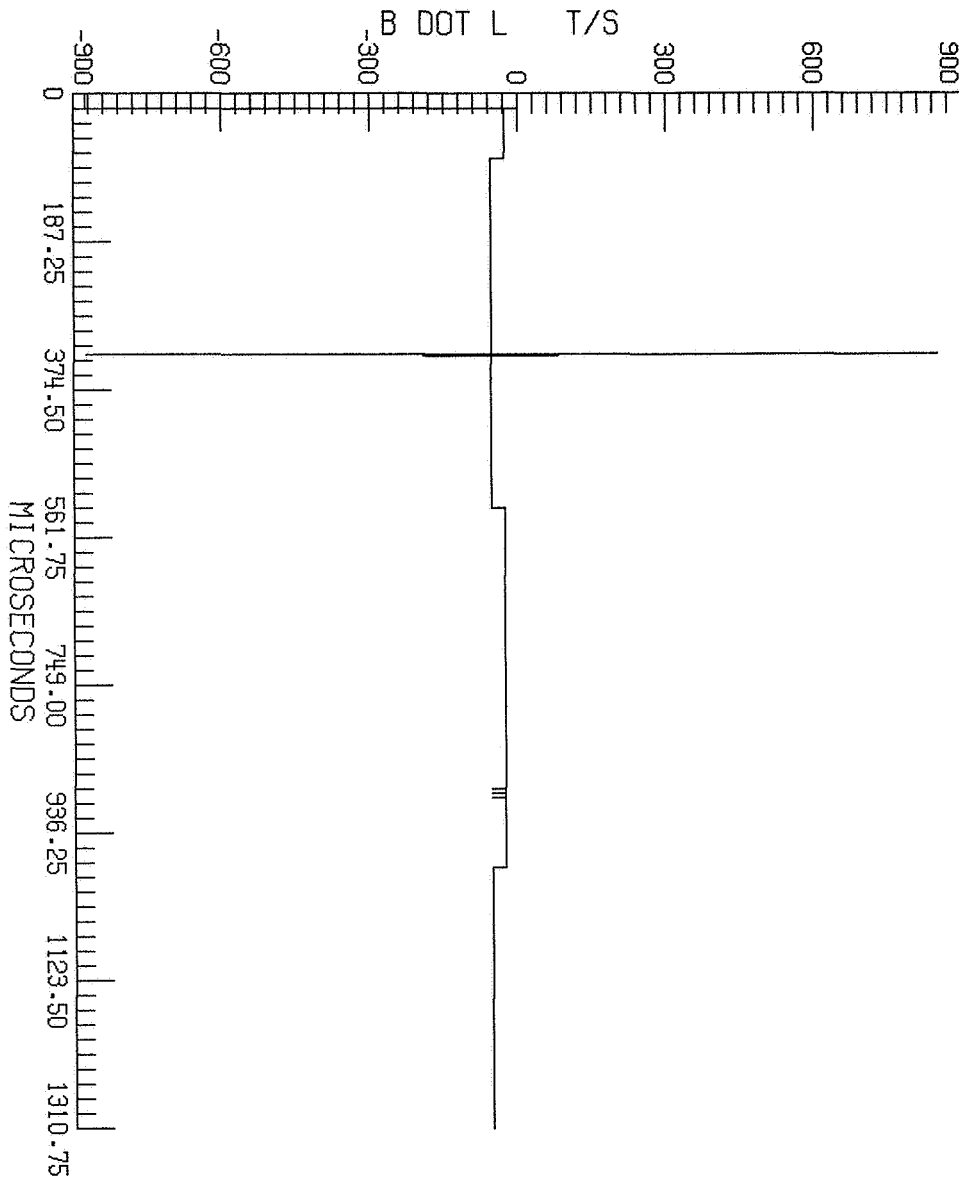


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TEST NO. 82-041

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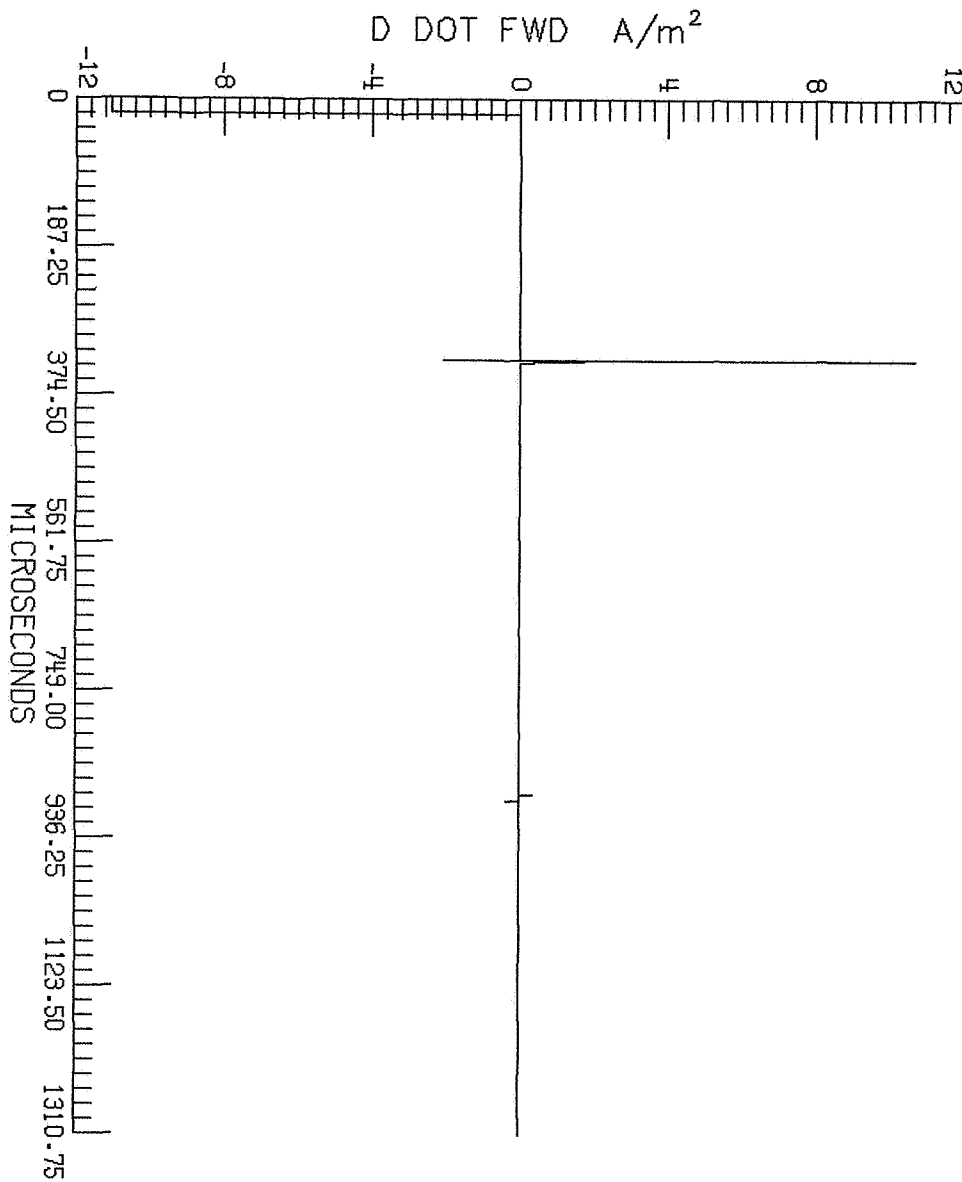


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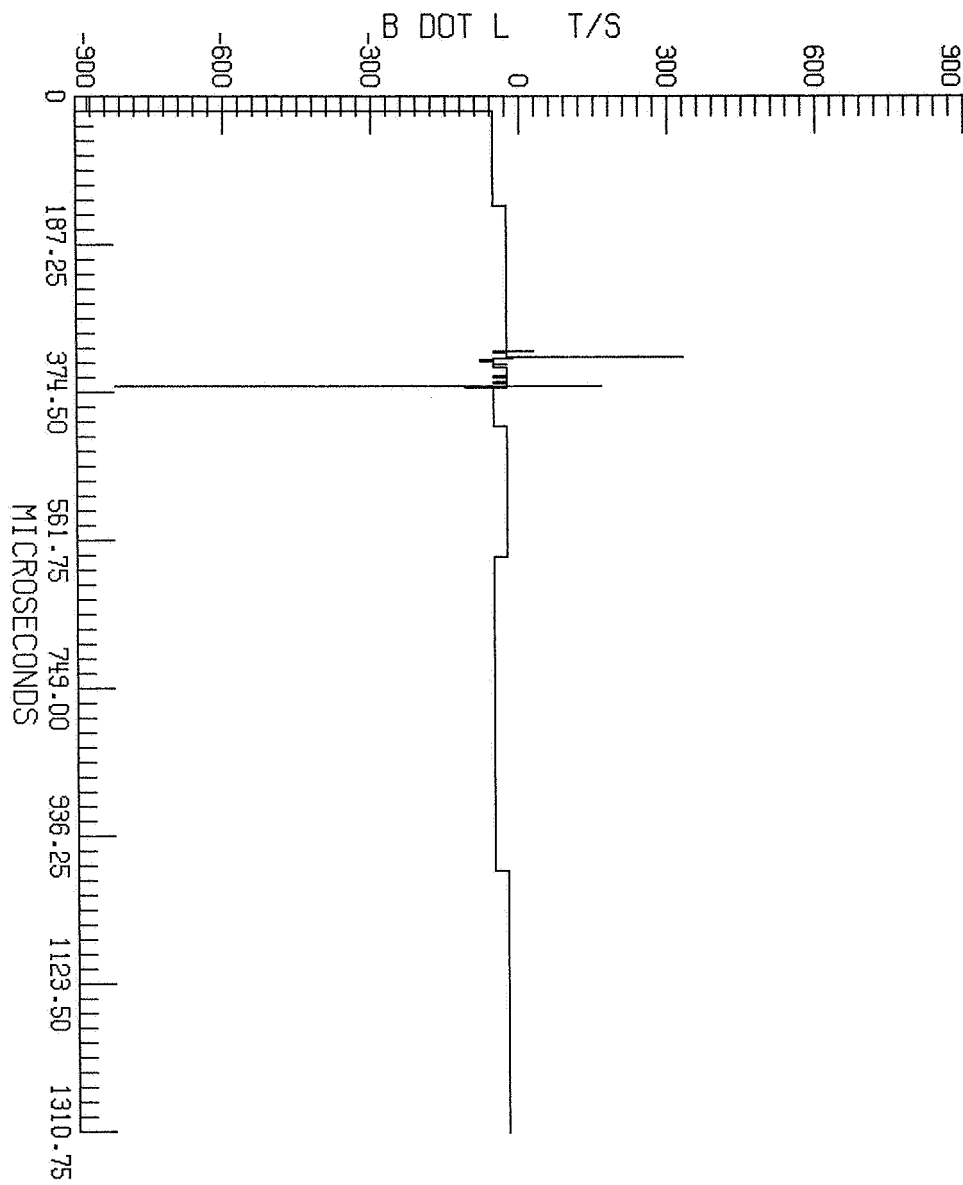


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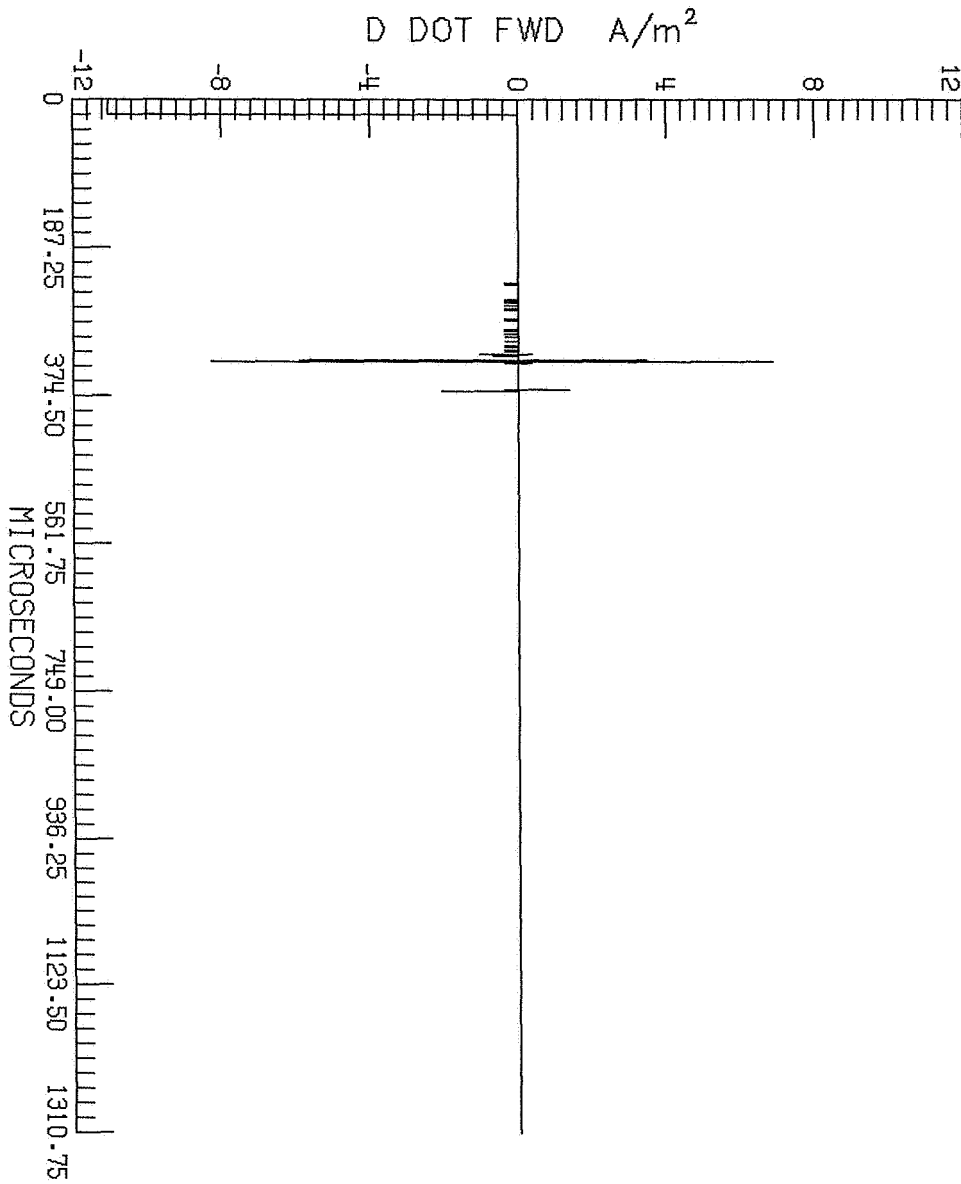


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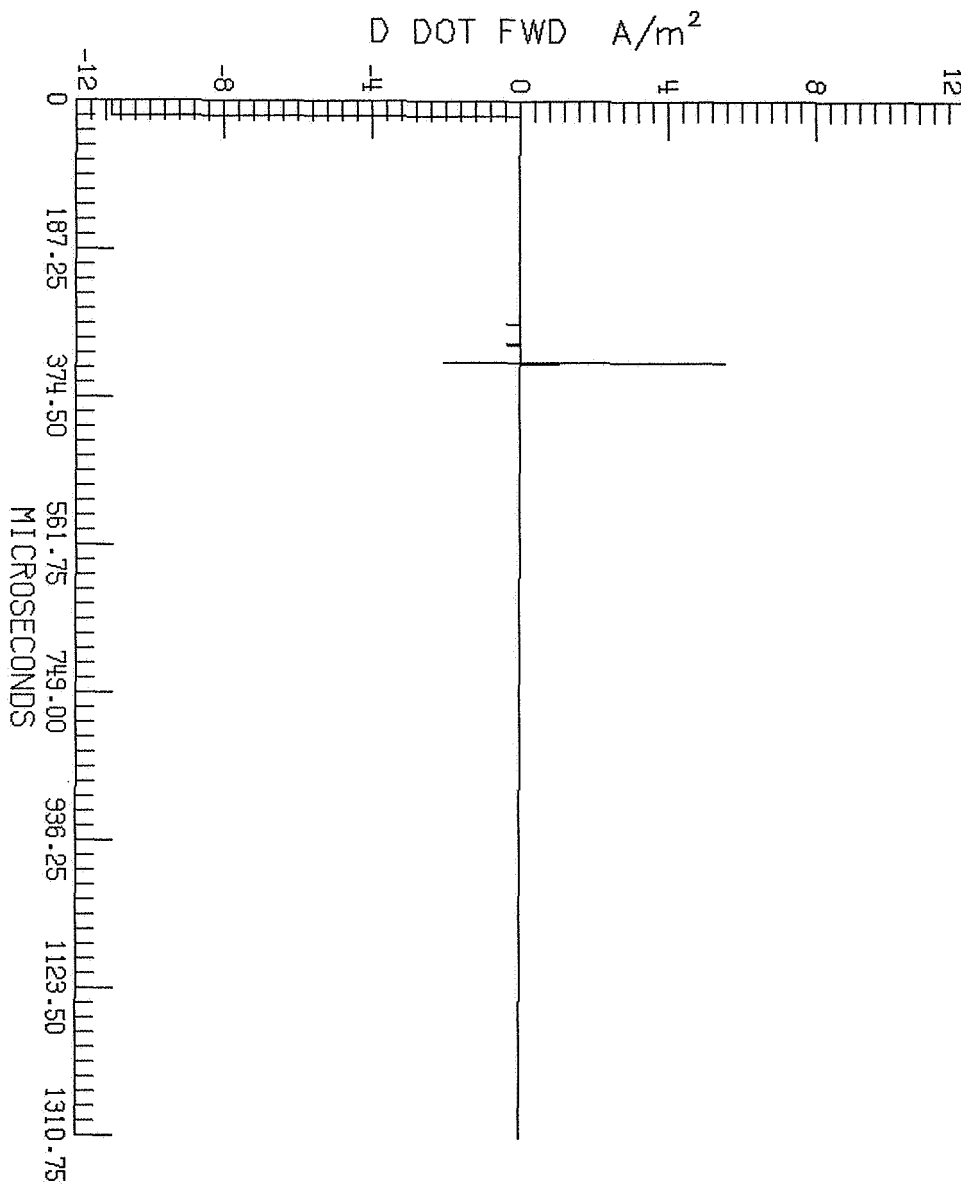


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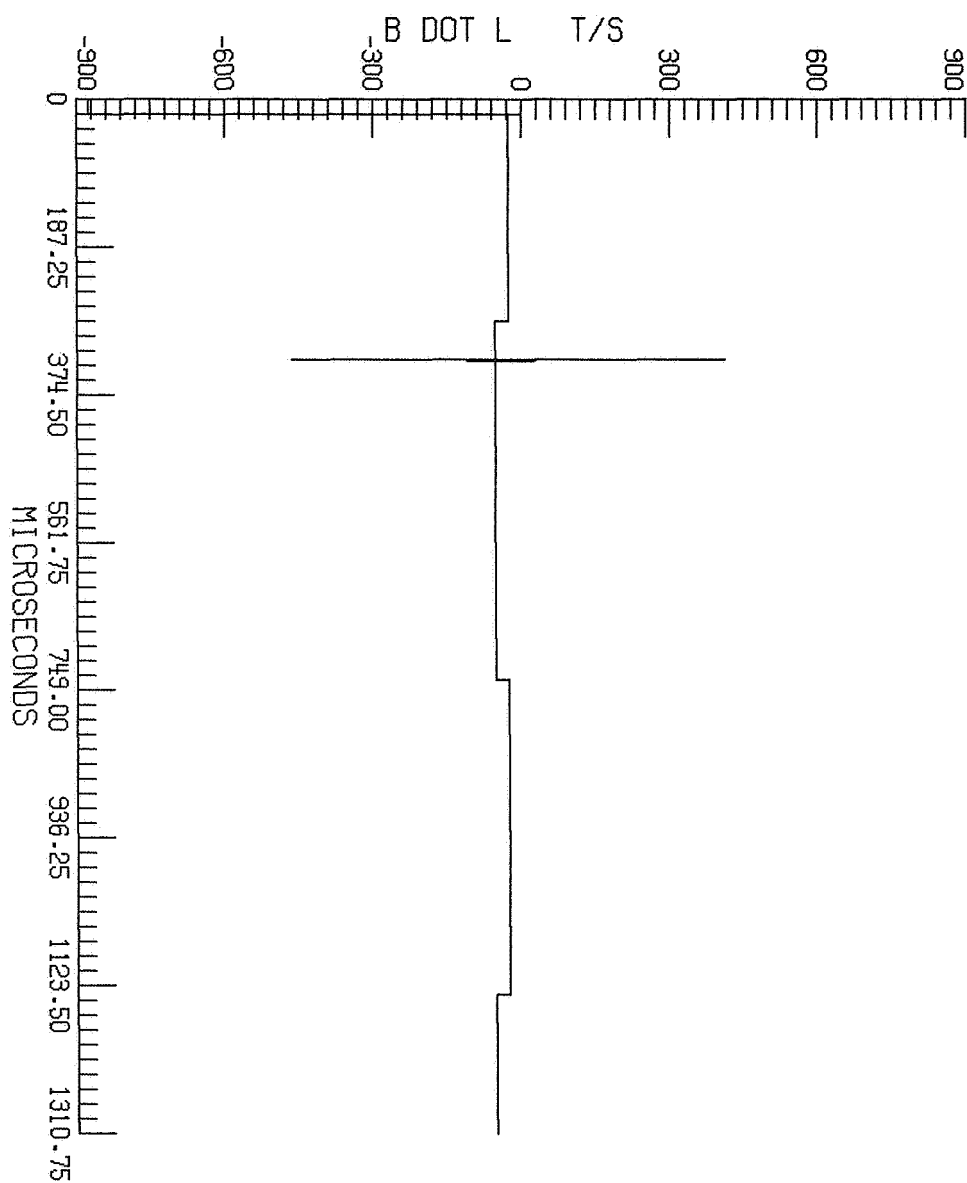


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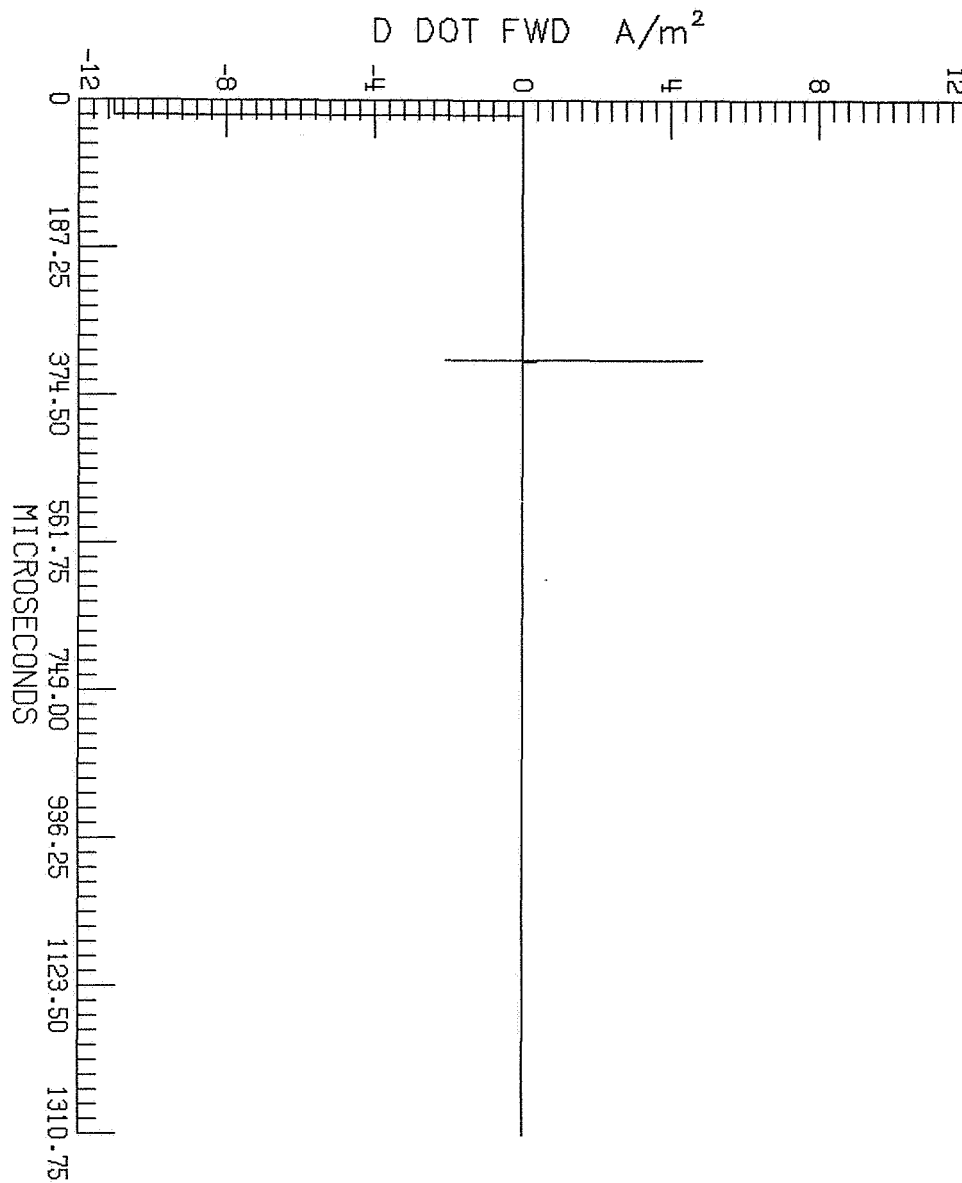


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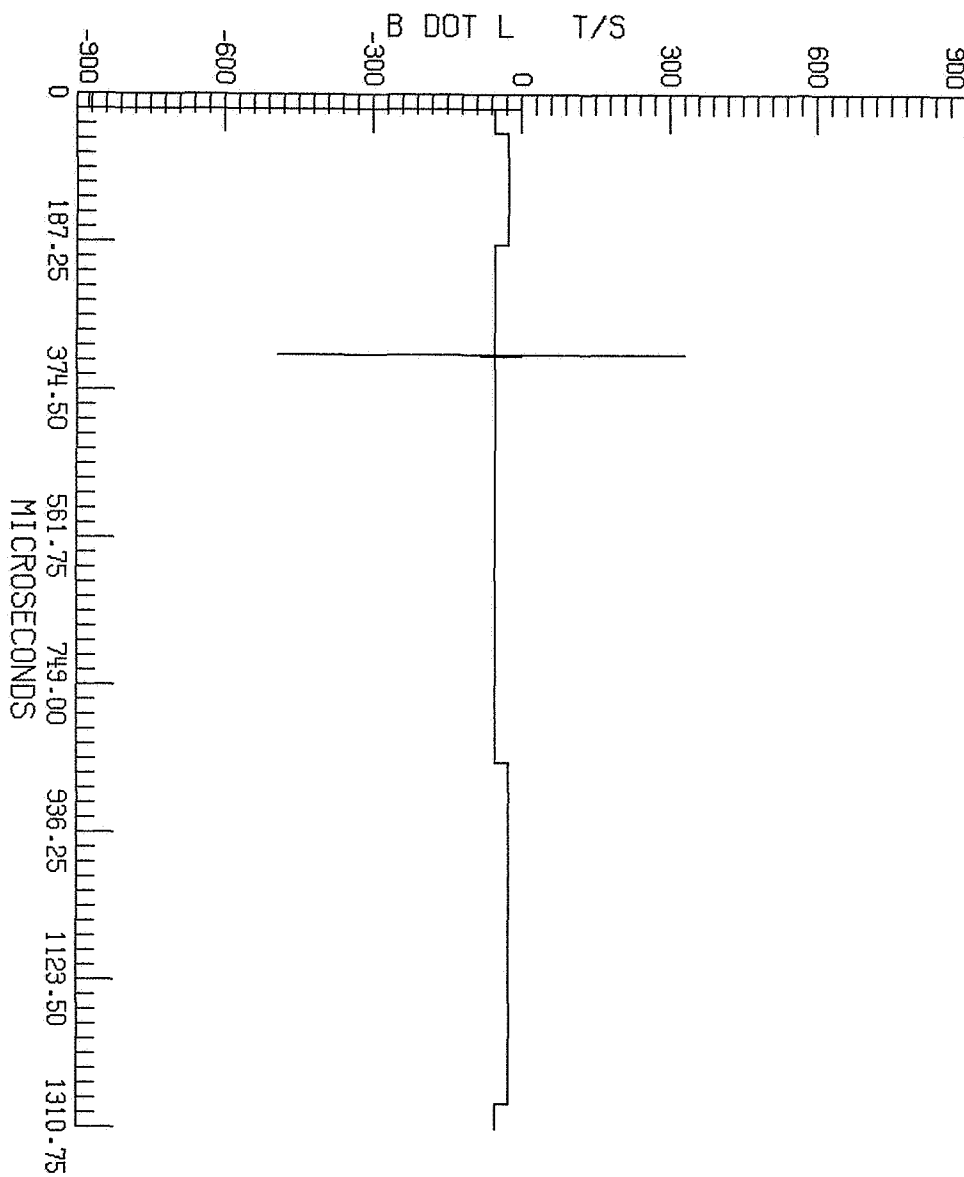


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TEST NO. 82-041

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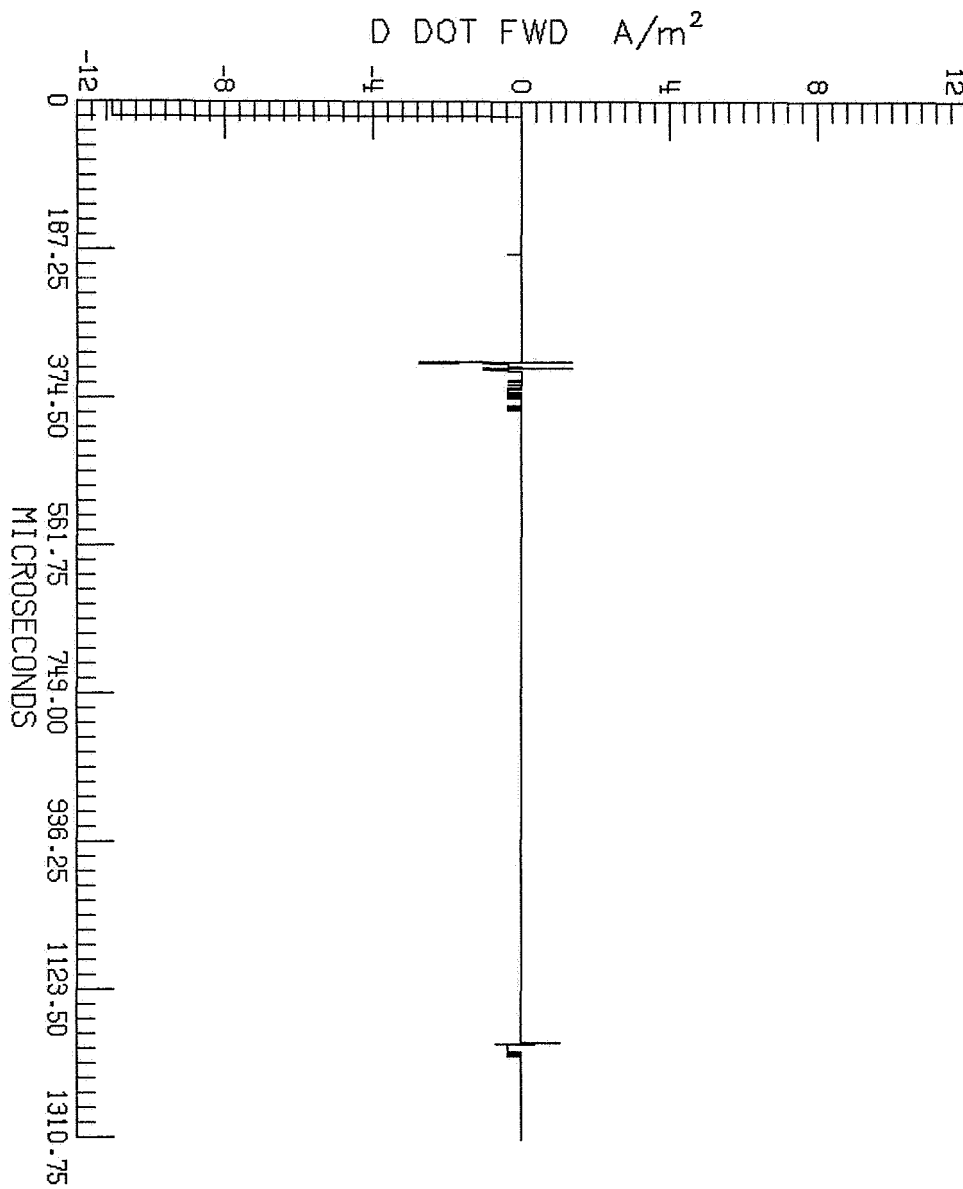


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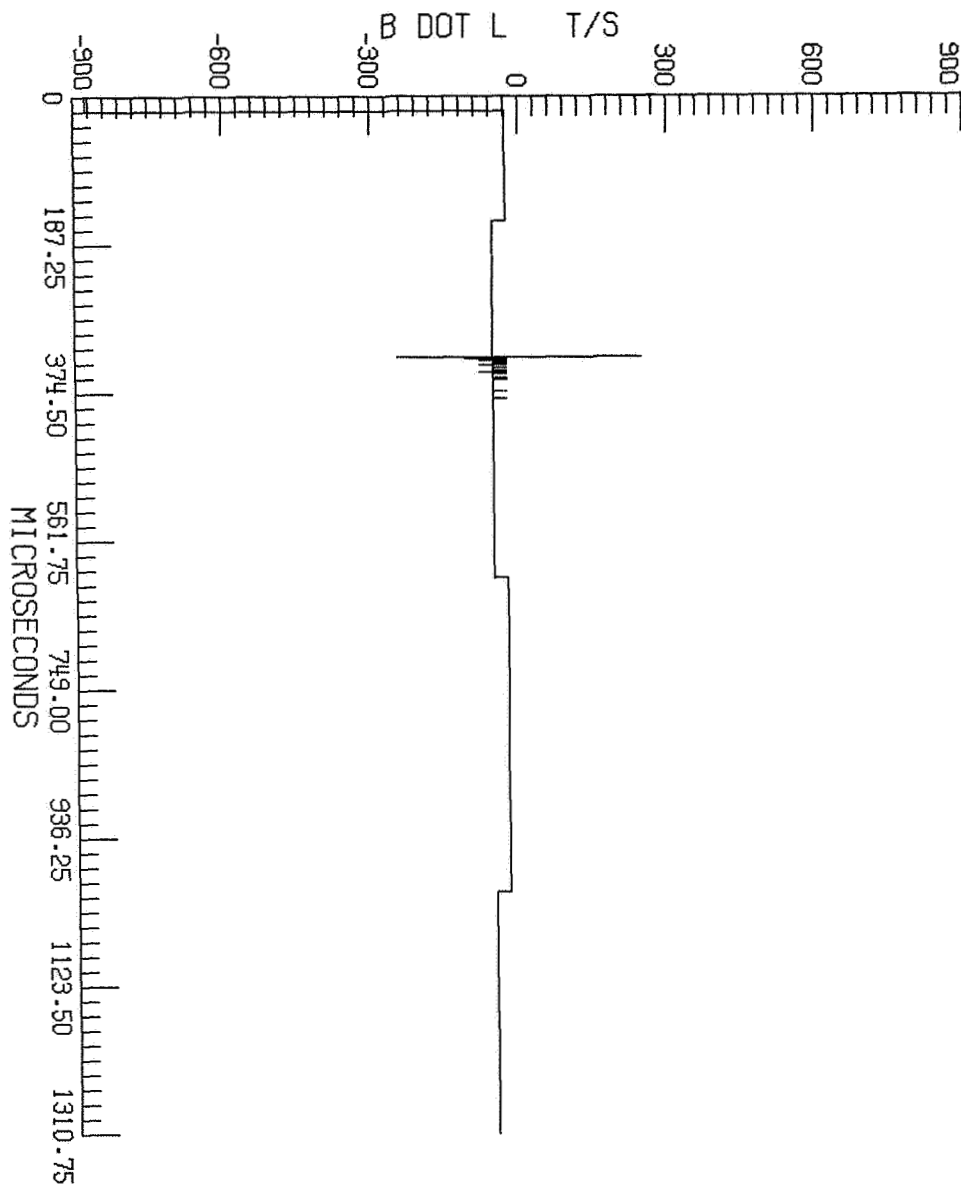


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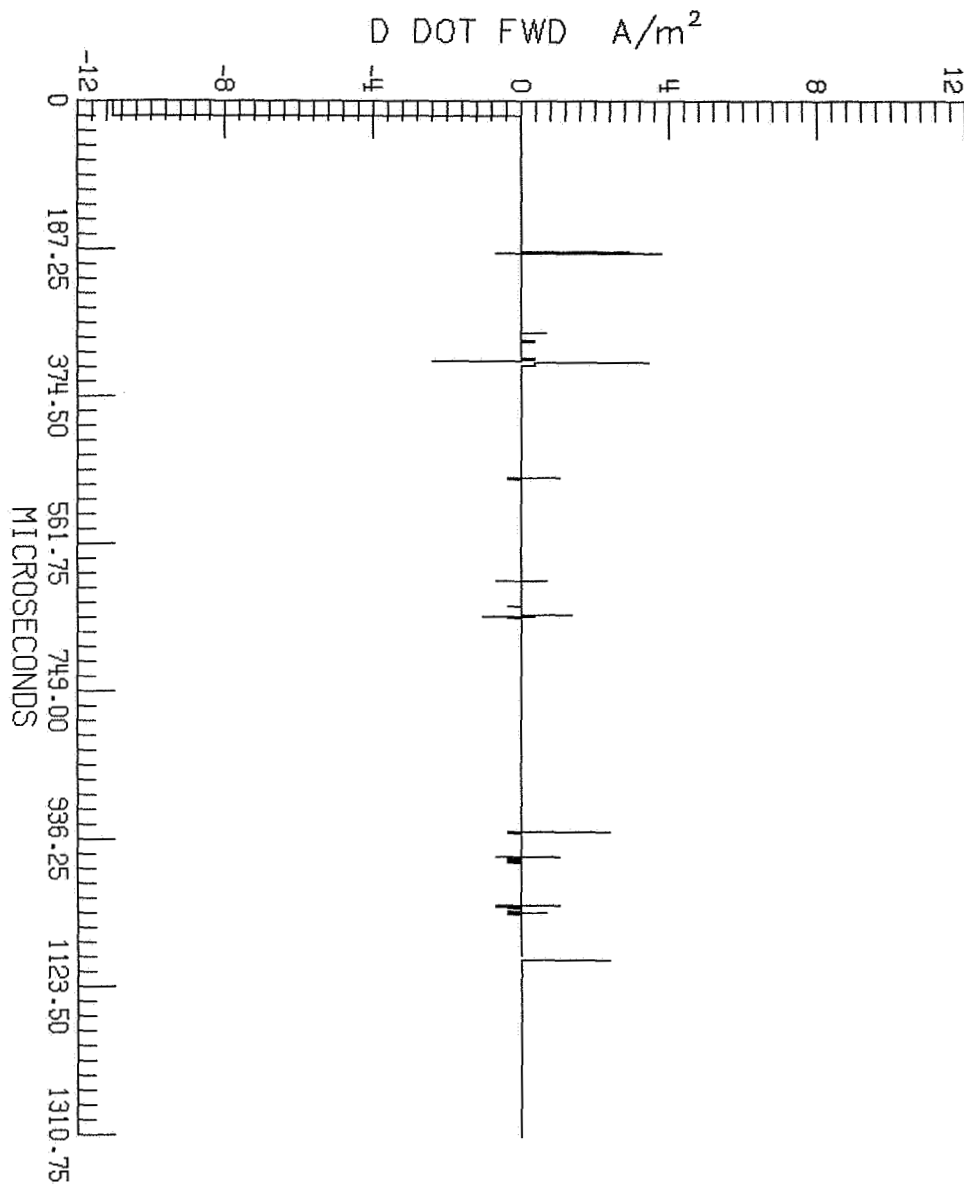


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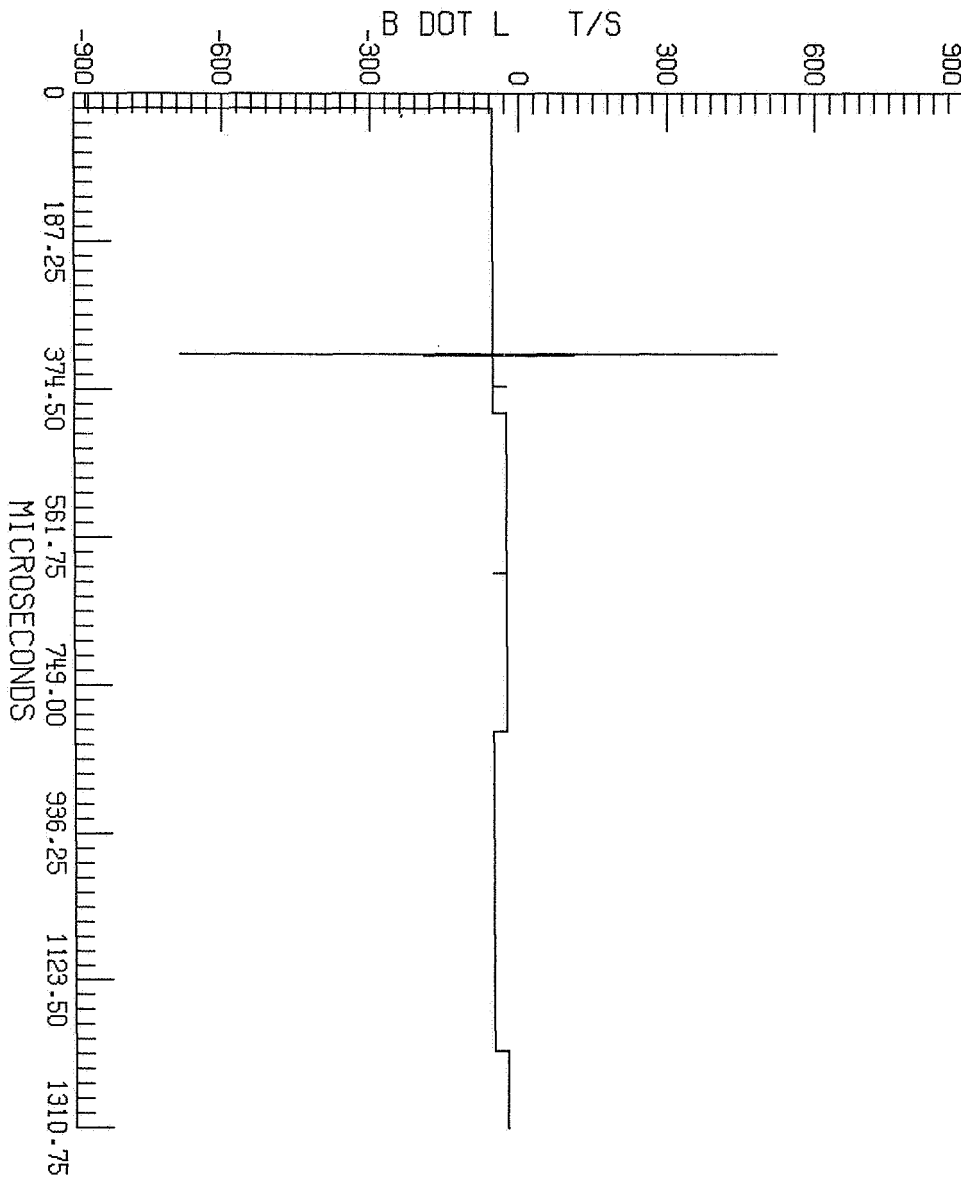
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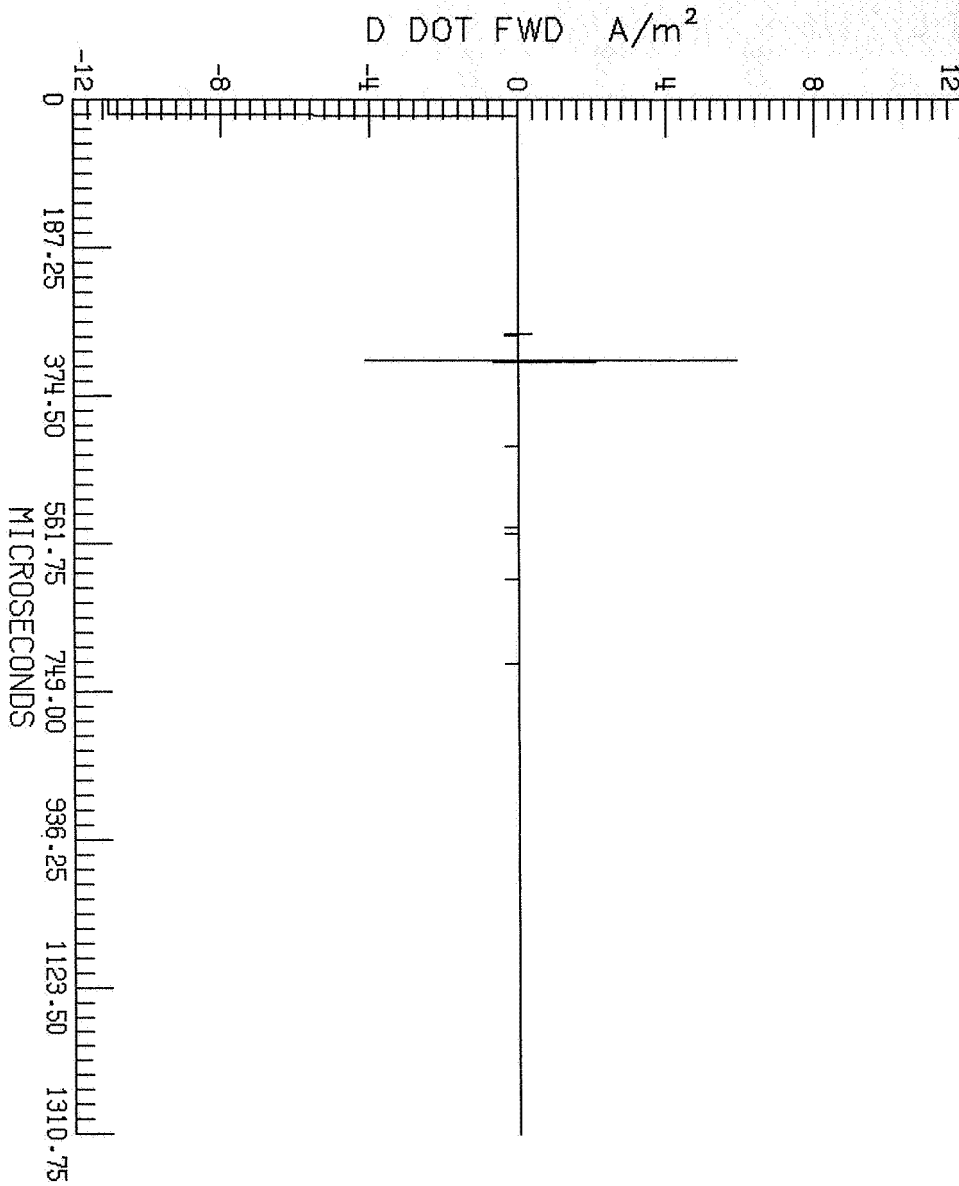


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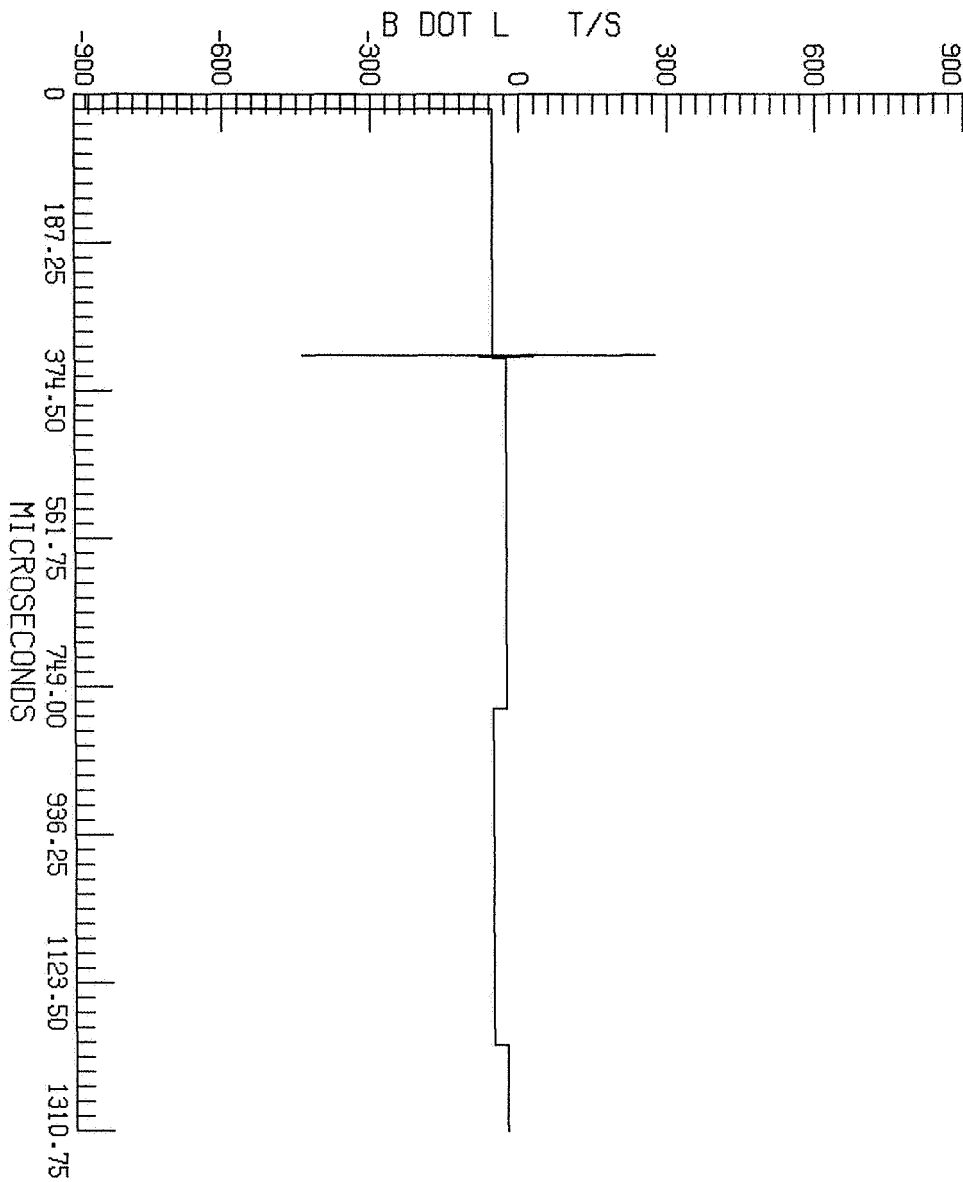


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TEST NO. 82-041

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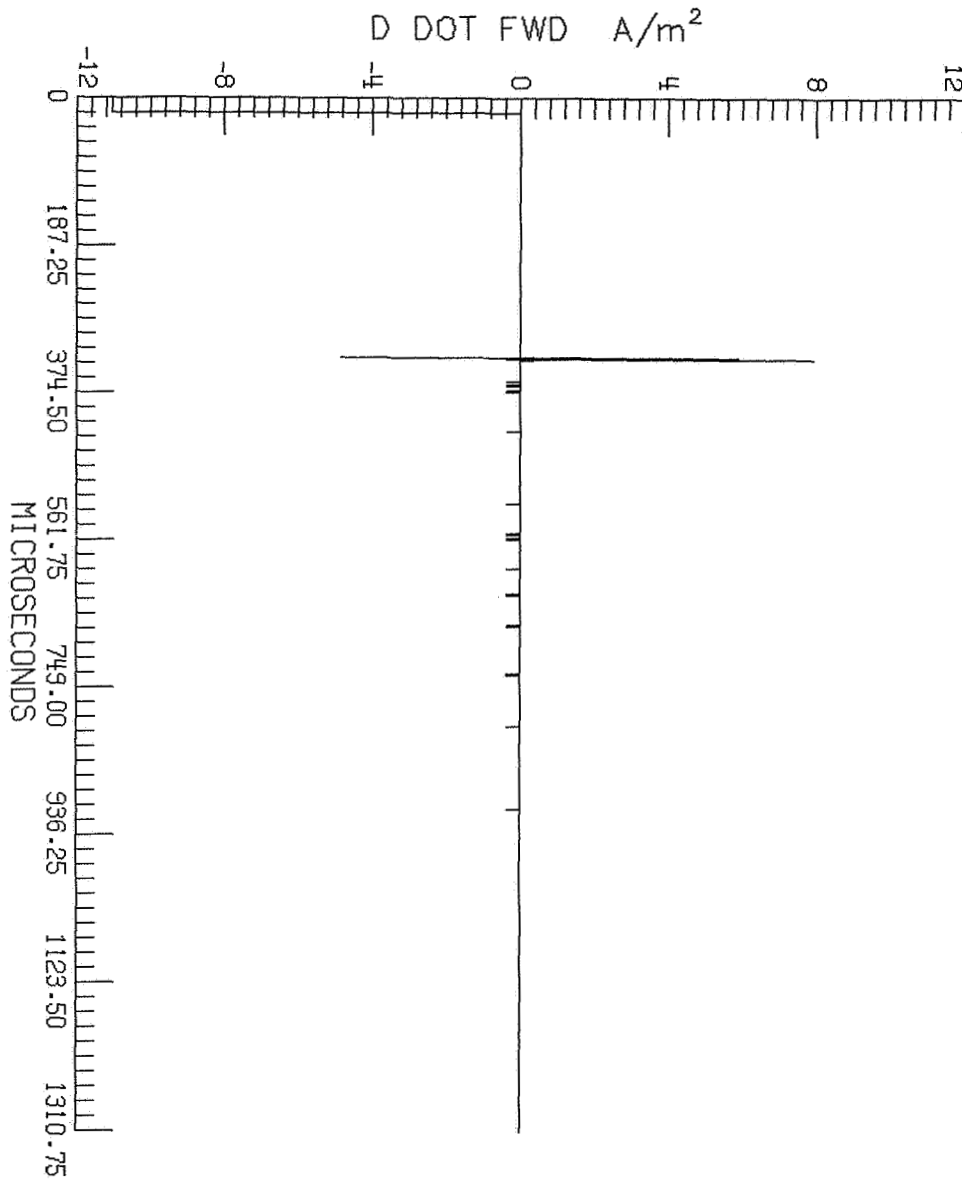


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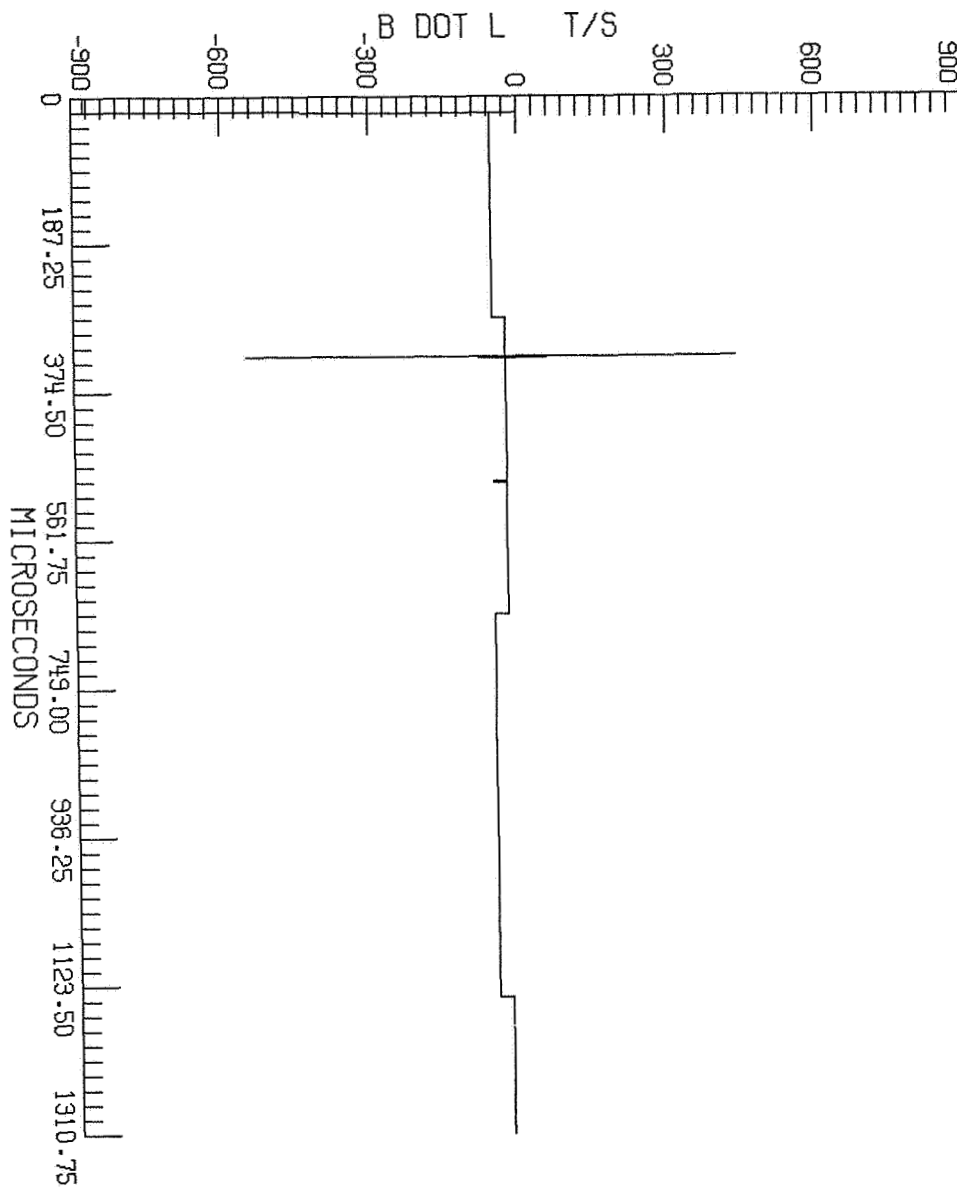


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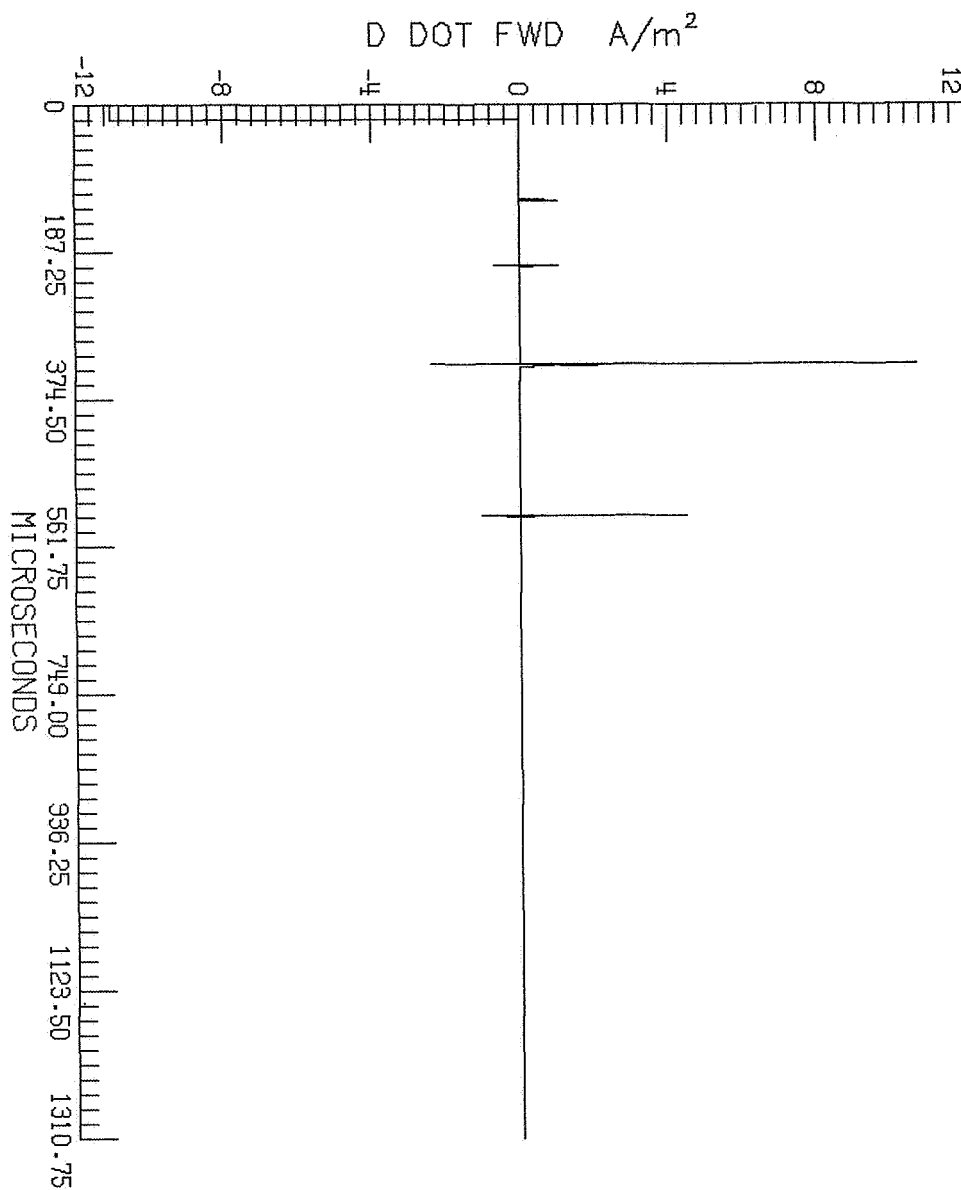


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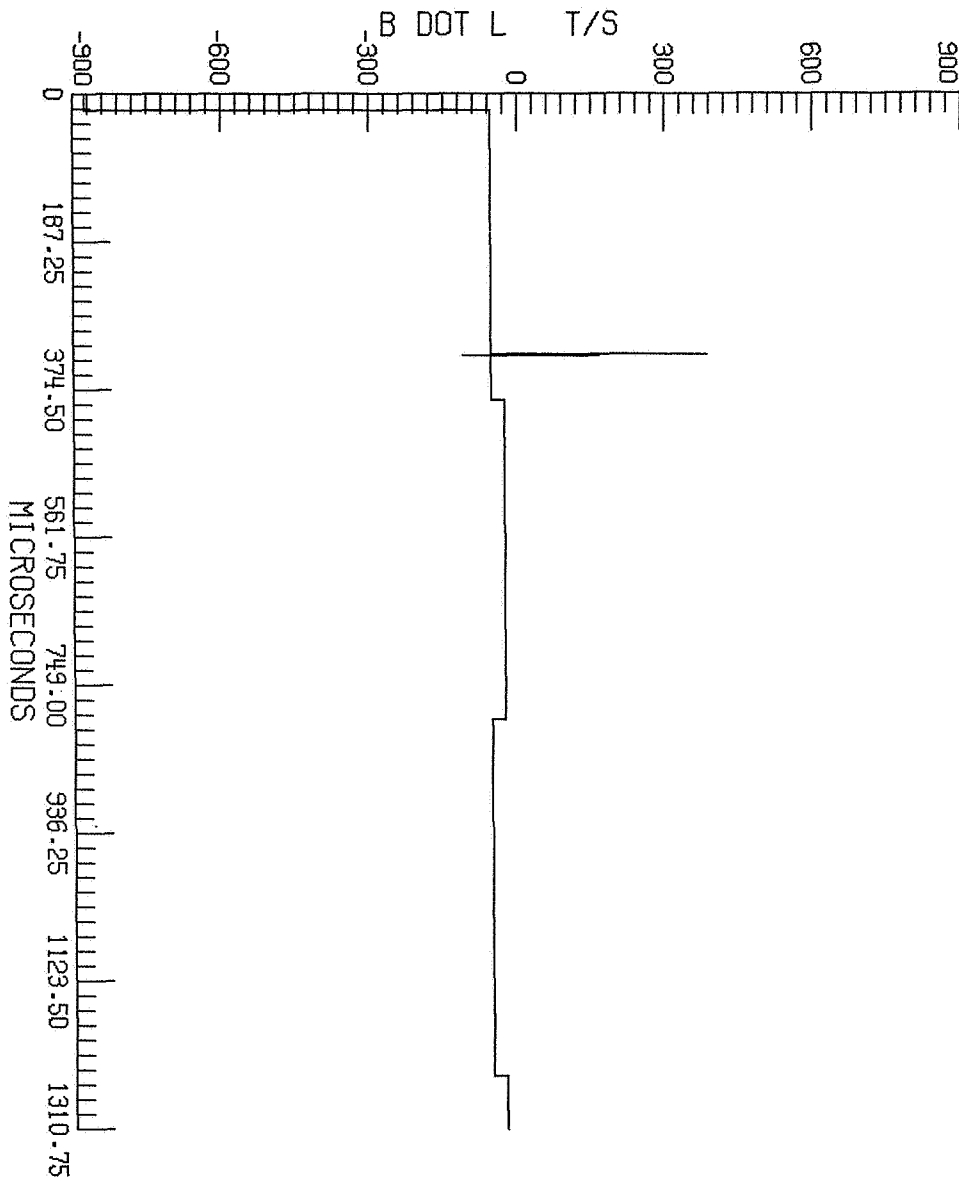


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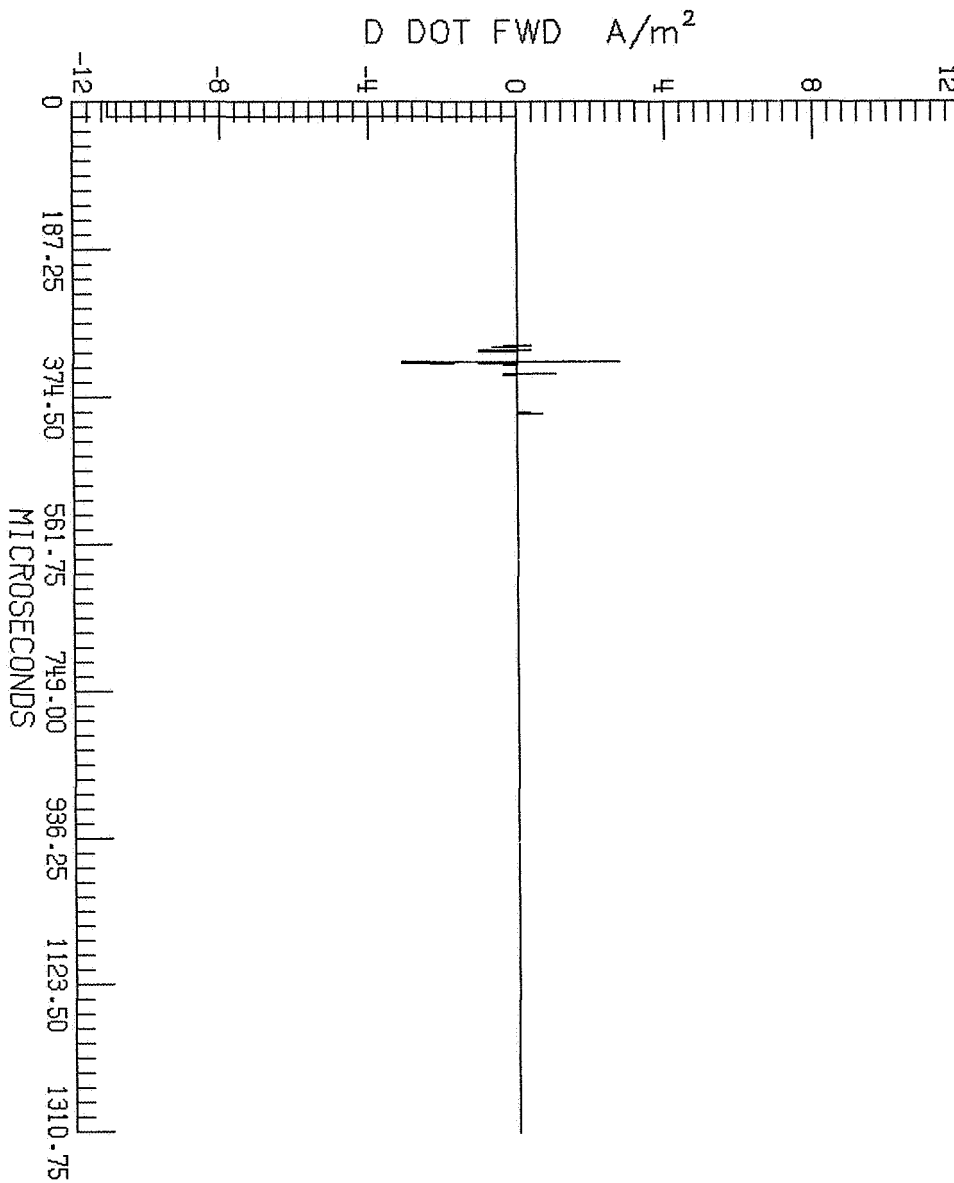


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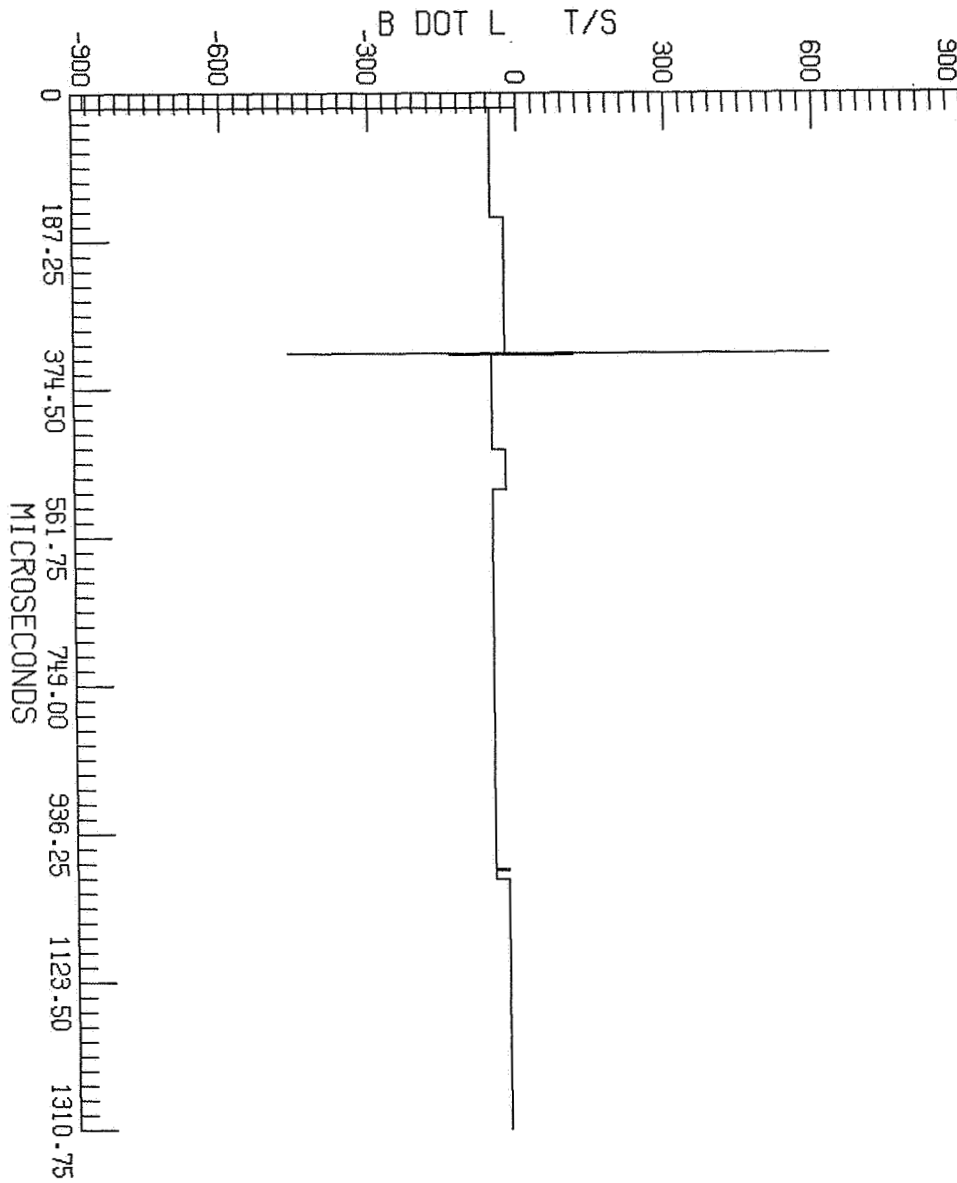


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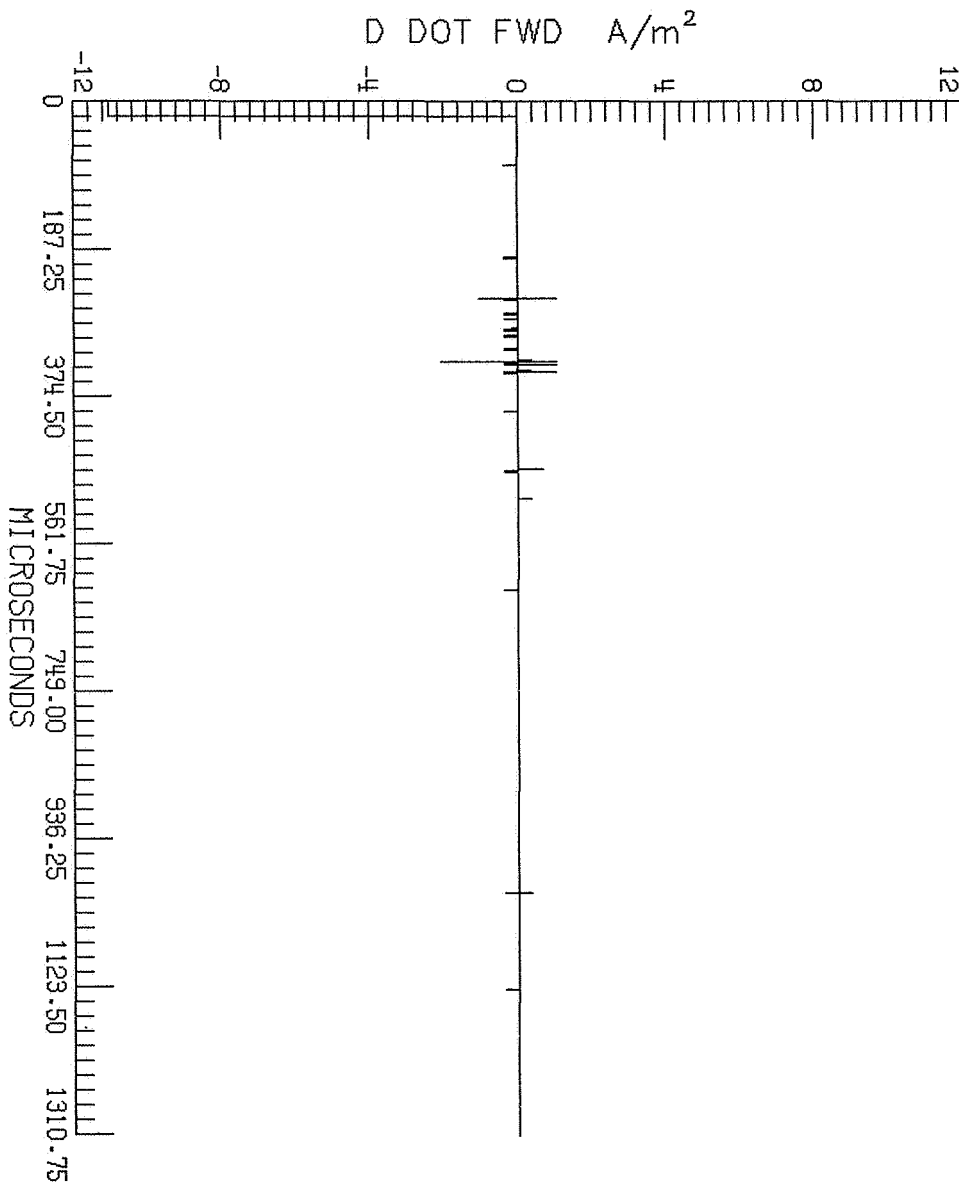


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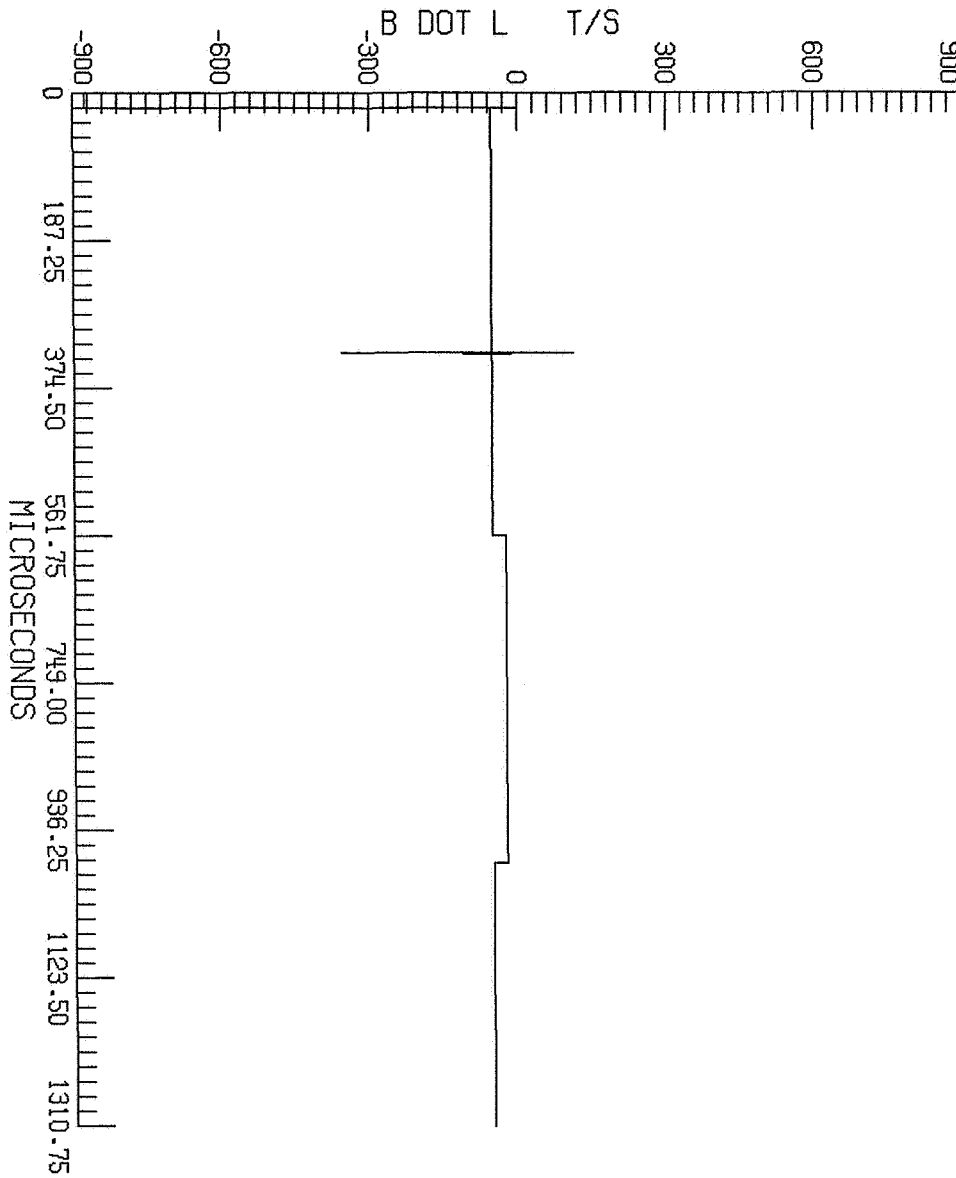


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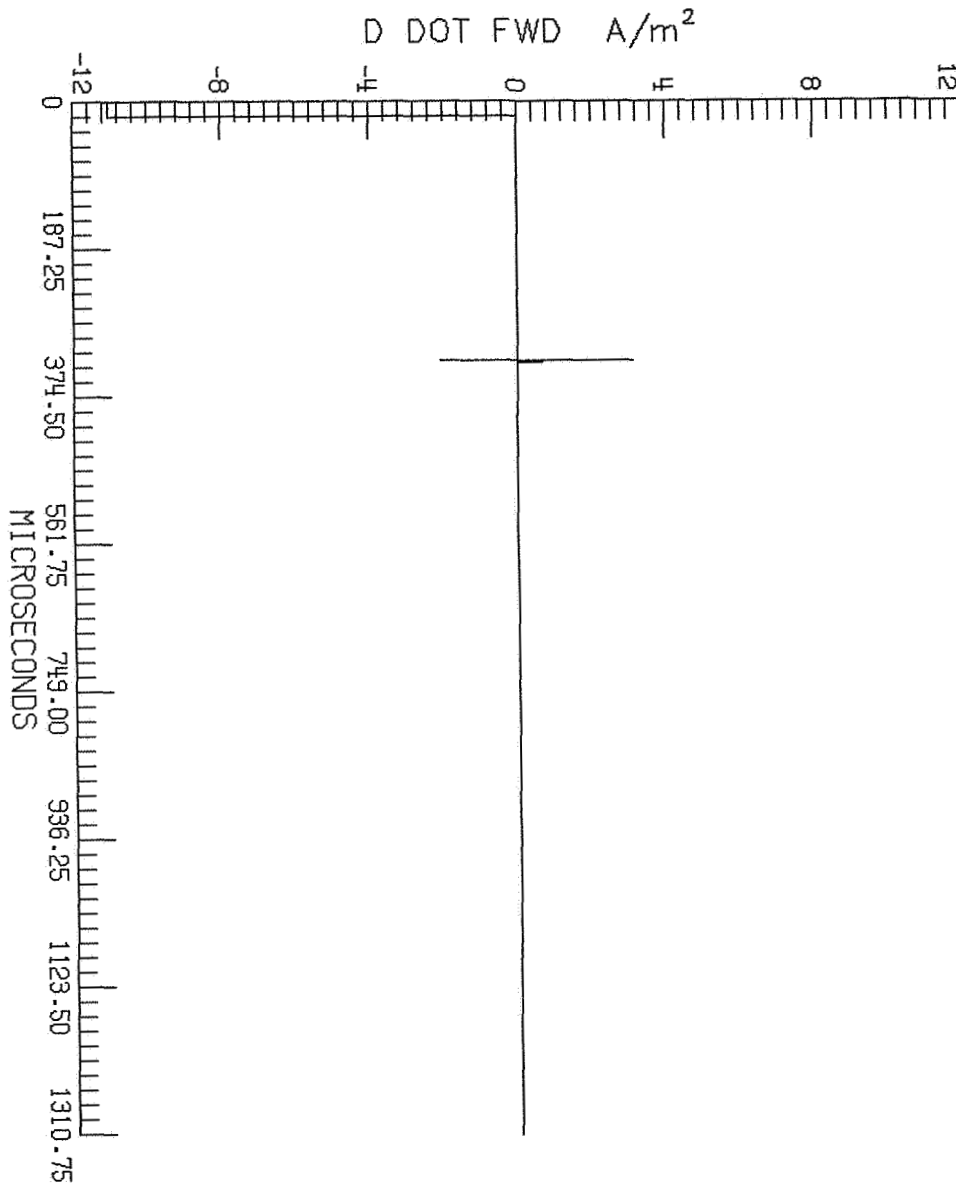


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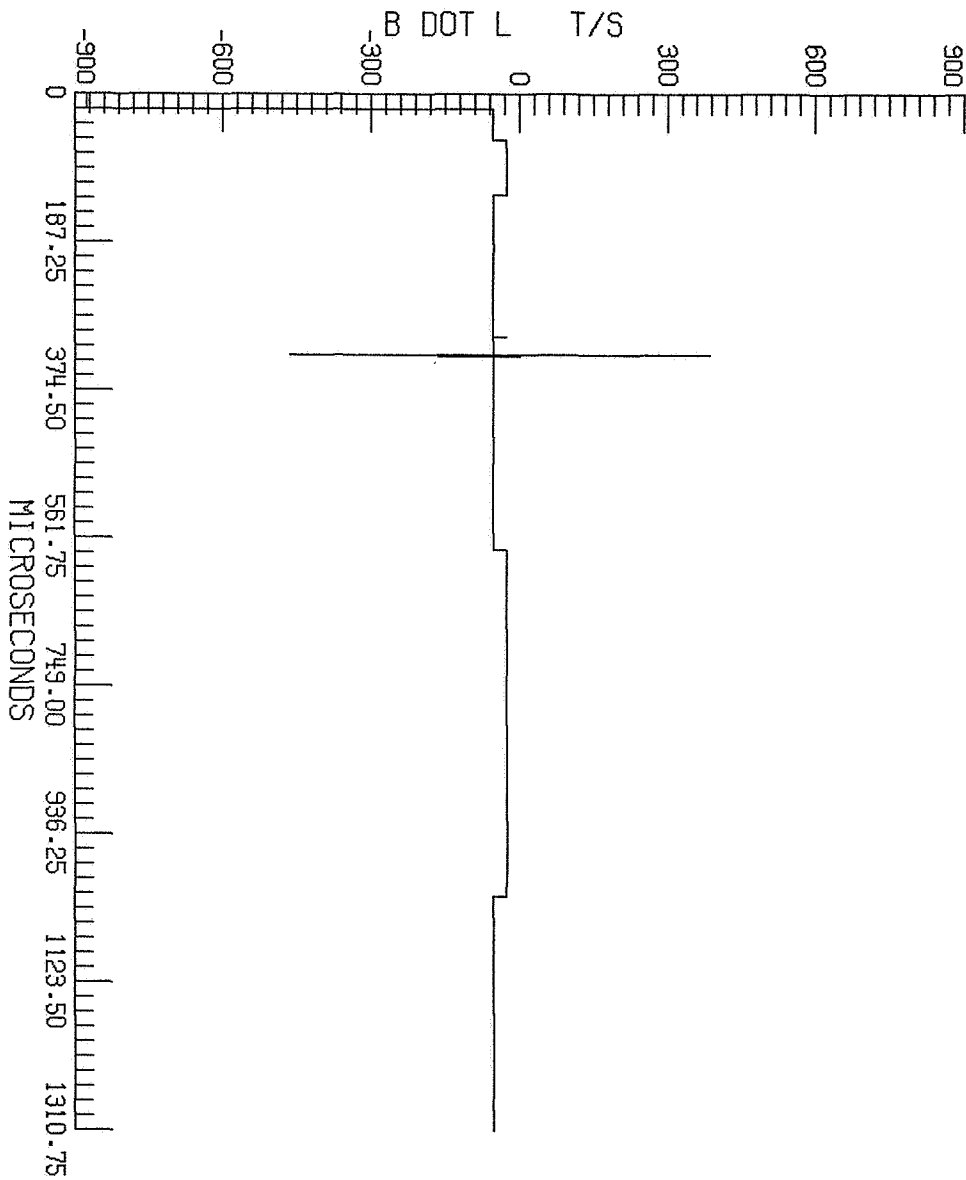
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F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-041

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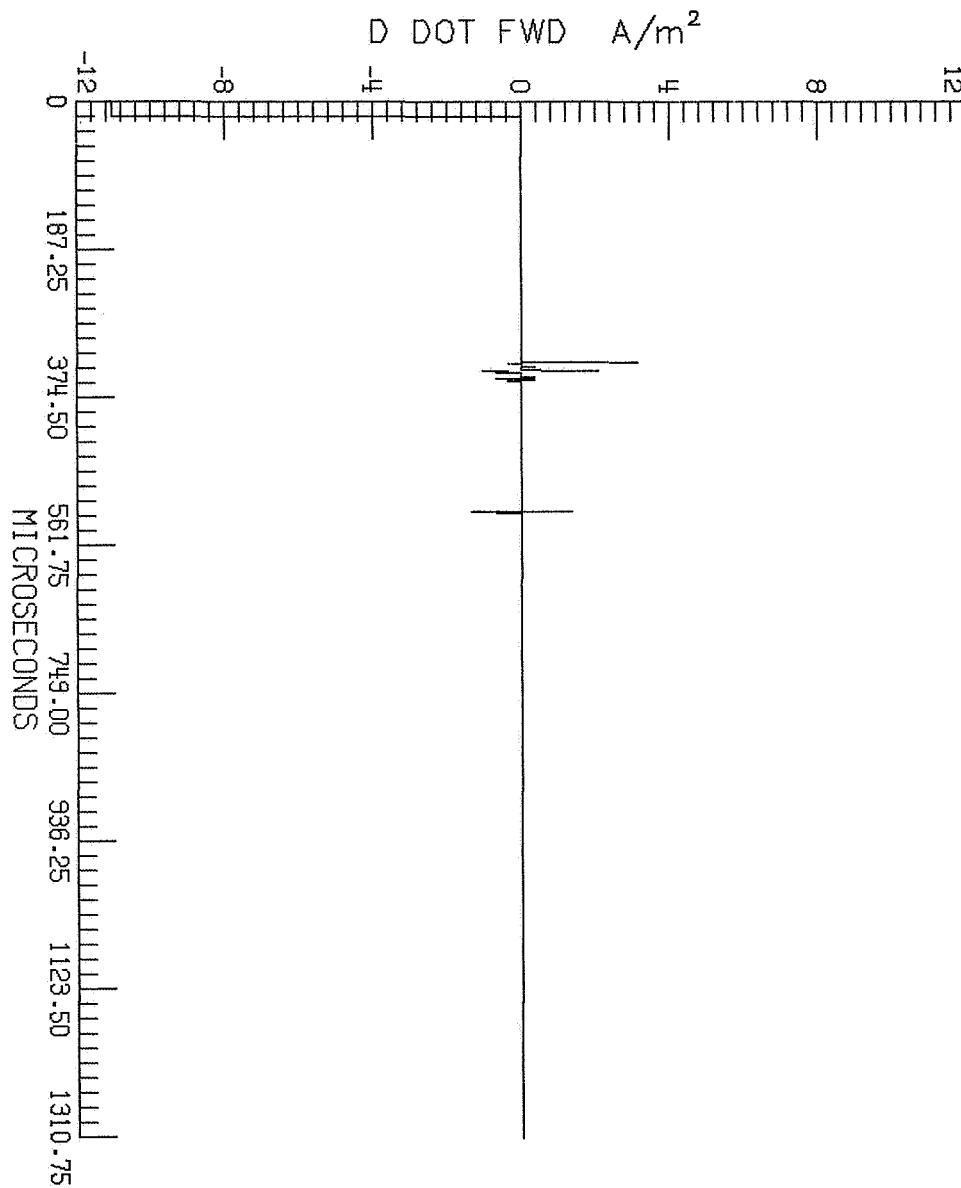


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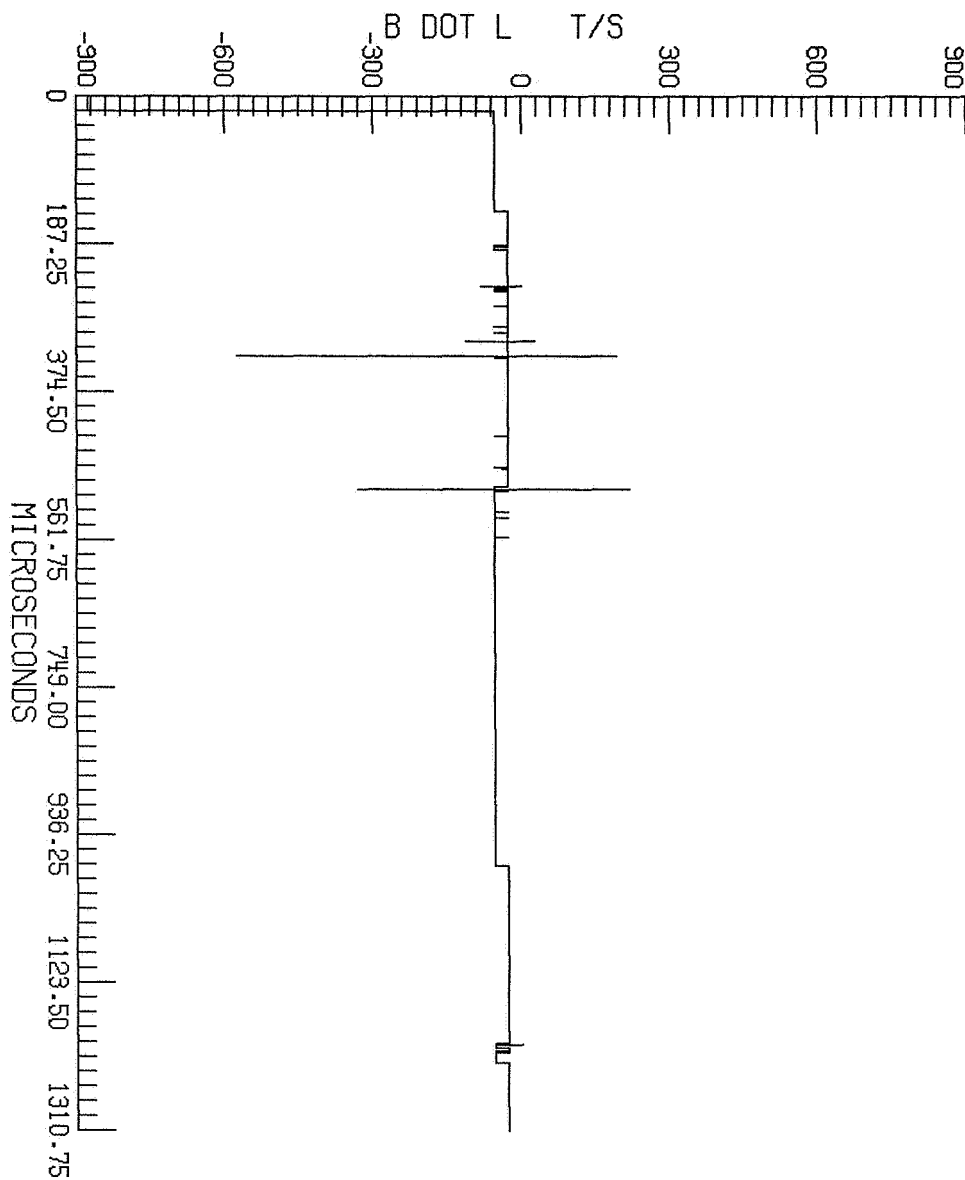
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F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-041

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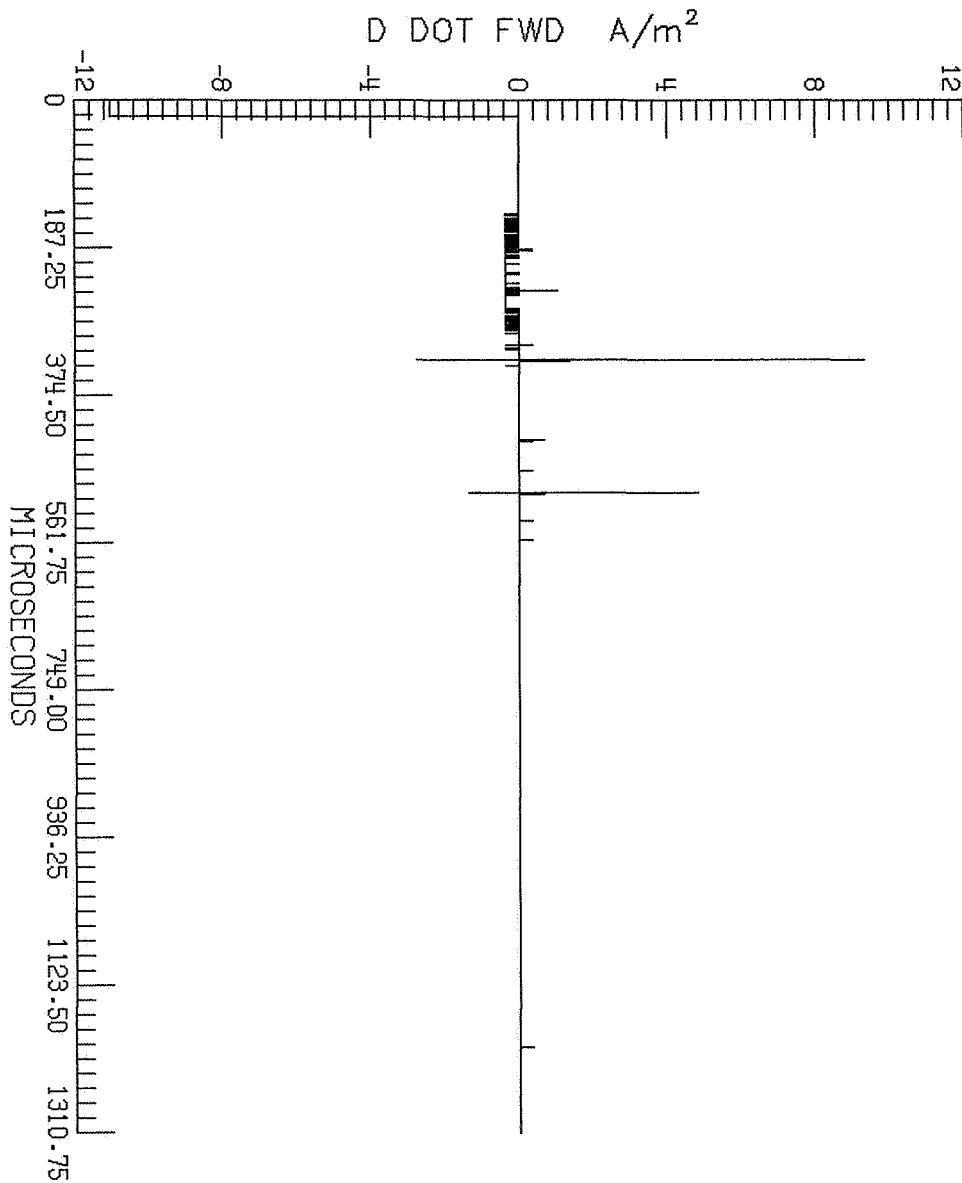


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TEST NO. 82-041

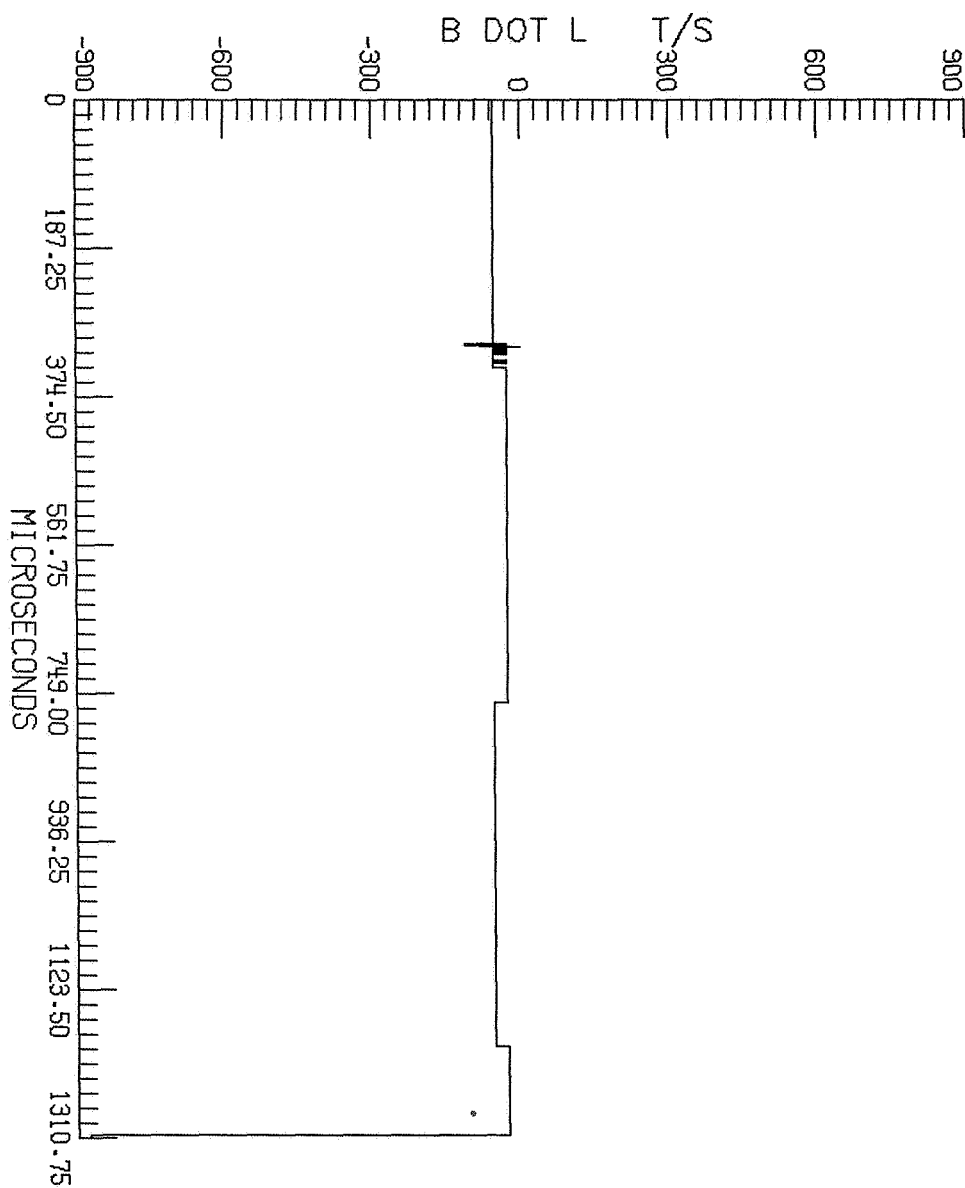
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F106 LIGHTNING/PCM/TK.8/THOMAS

TEST NO. 82-042

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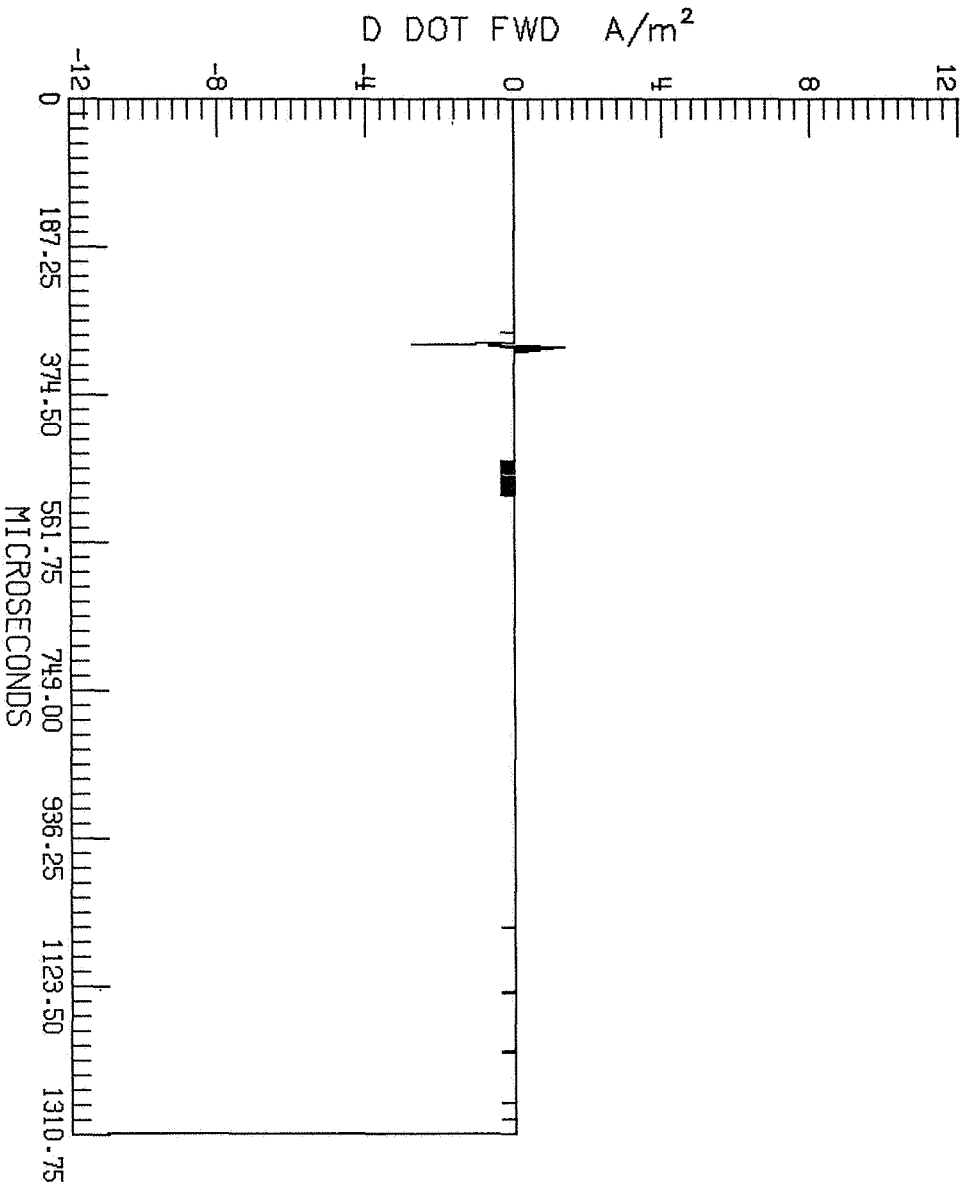


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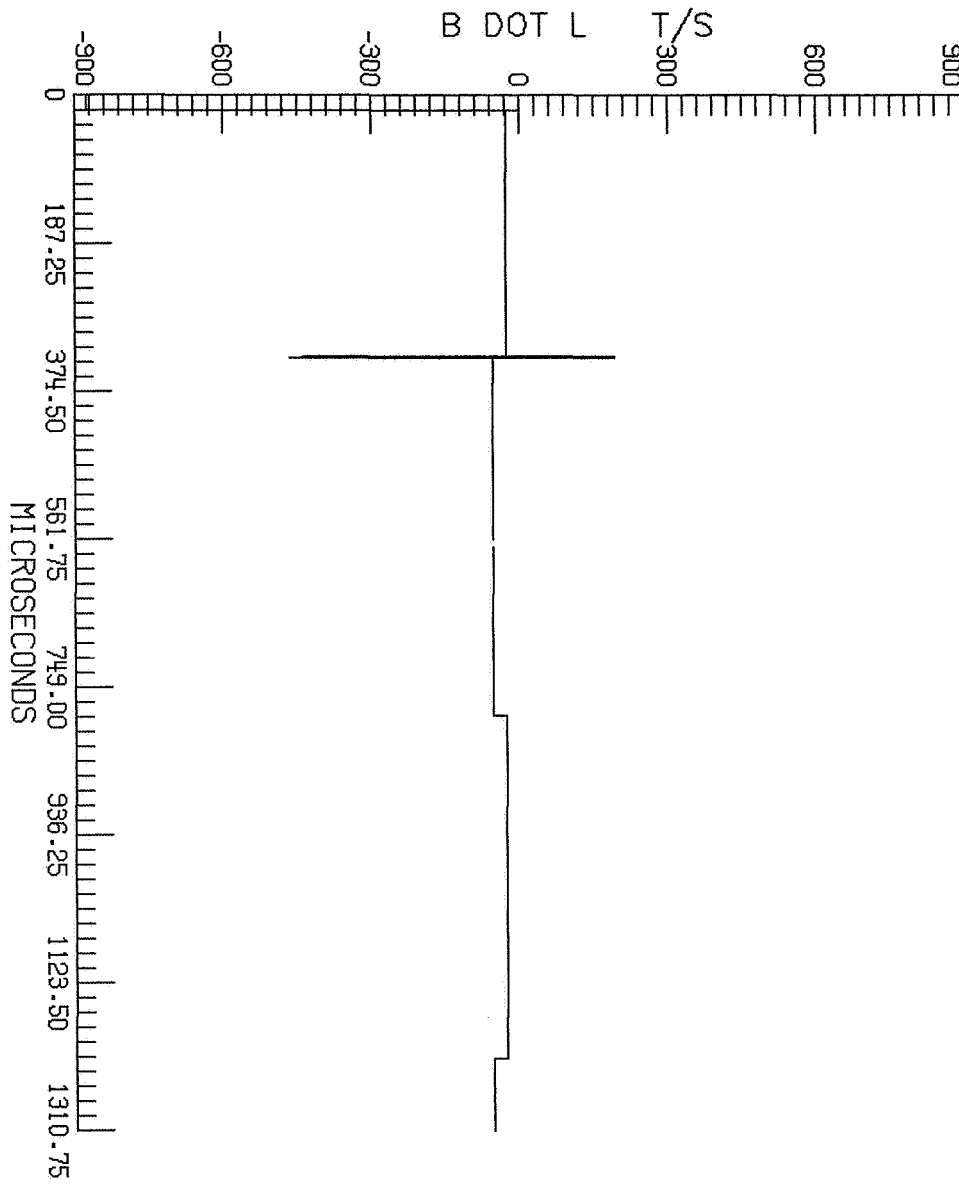
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F106 LIGHTNING/PCM/TK.8/THOMAS

TEST NO. 82-042

RUN NO. 2

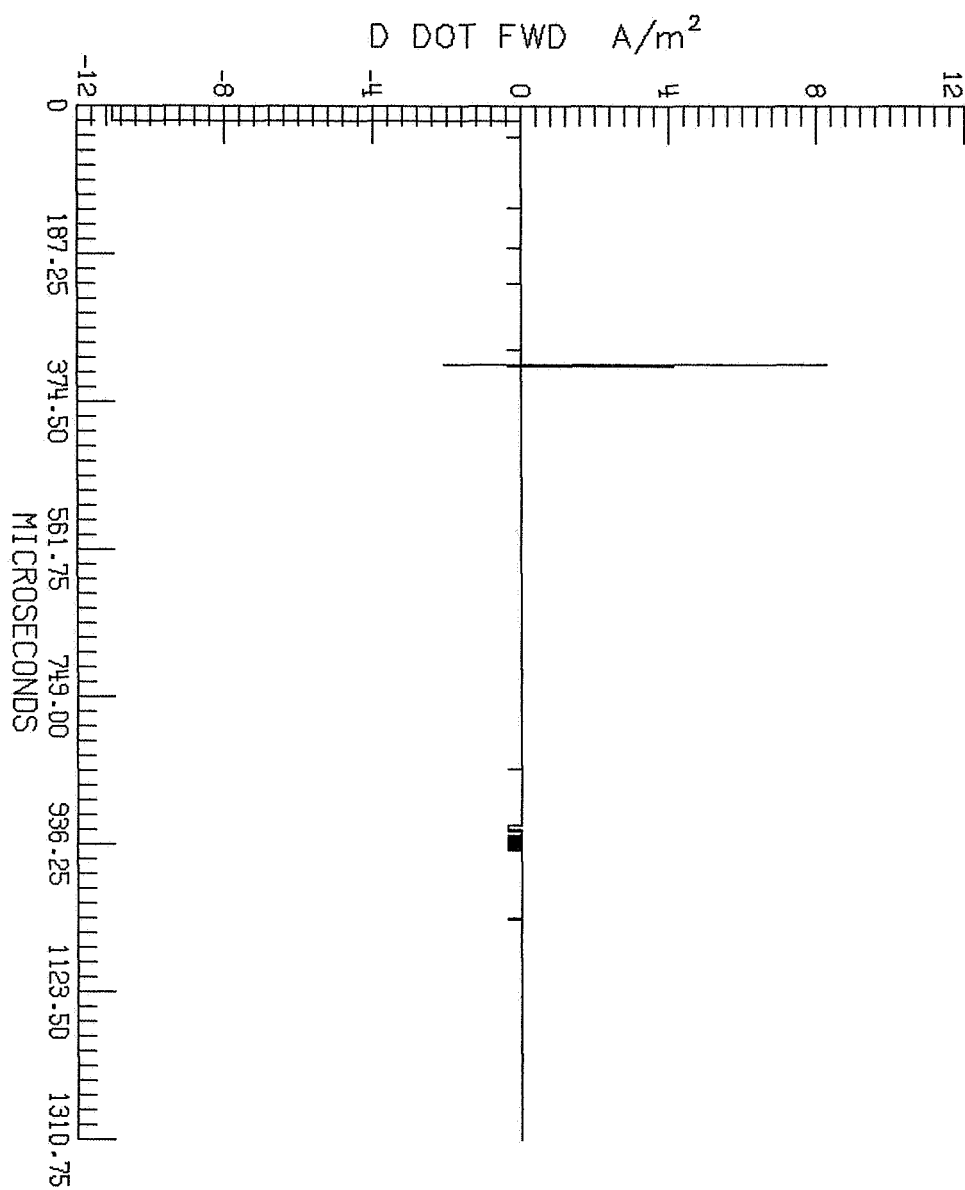


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TEST NO. 82-042

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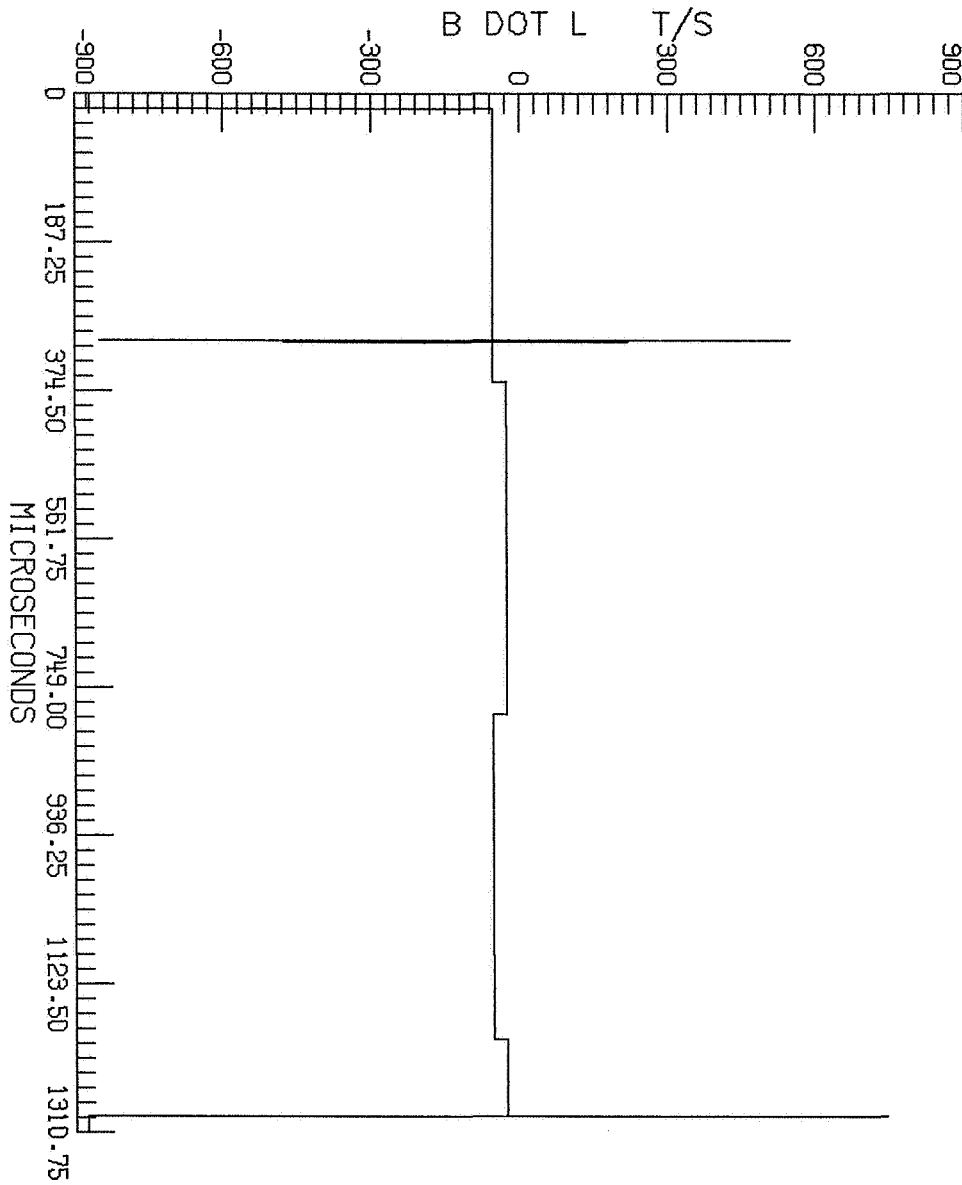


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F106 LIGHTNING/PCM/TK.8/THOMAS

TEST NO. 82-042

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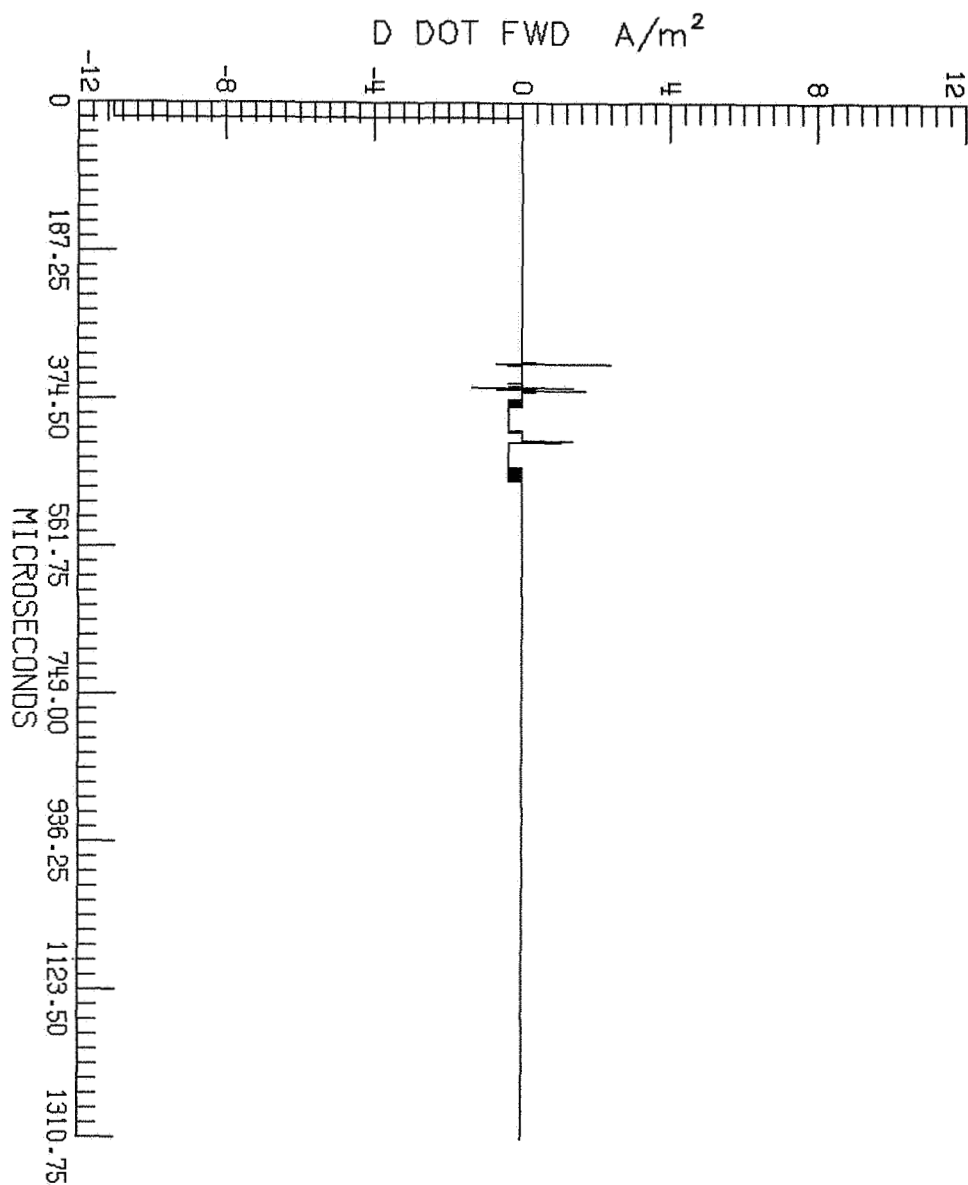


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TEST NO. 82-042

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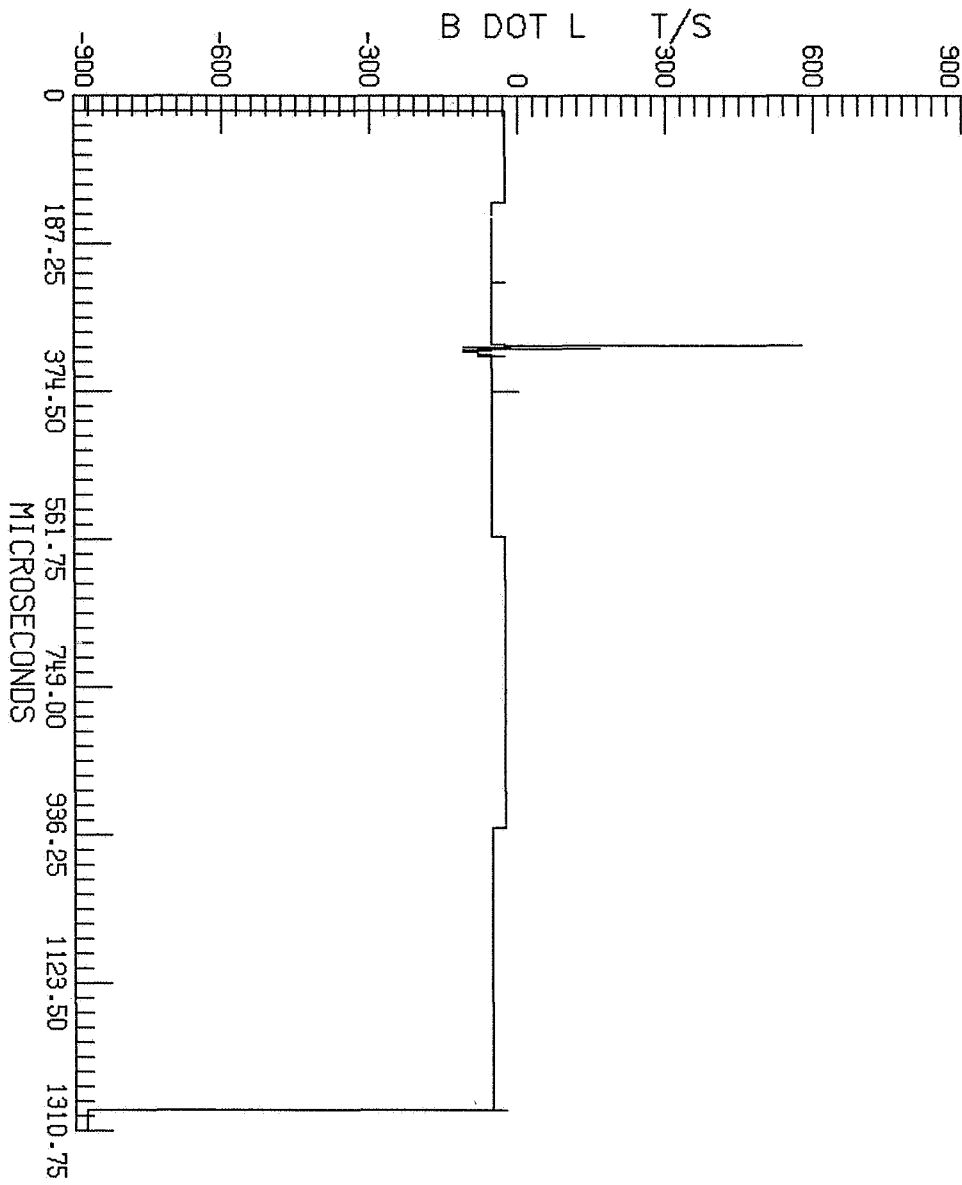


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TEST NO. 82-042

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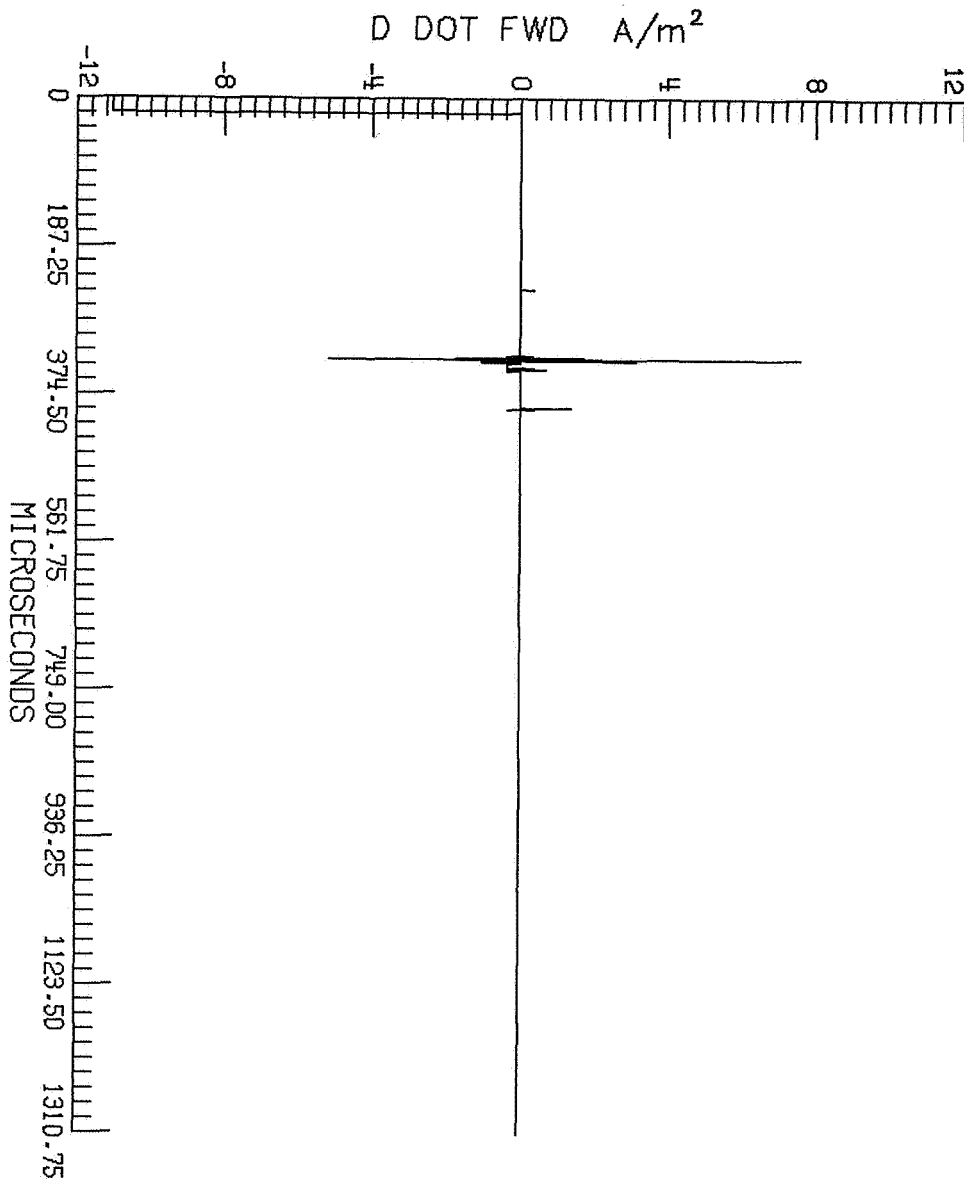


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TEST NO. 82-042

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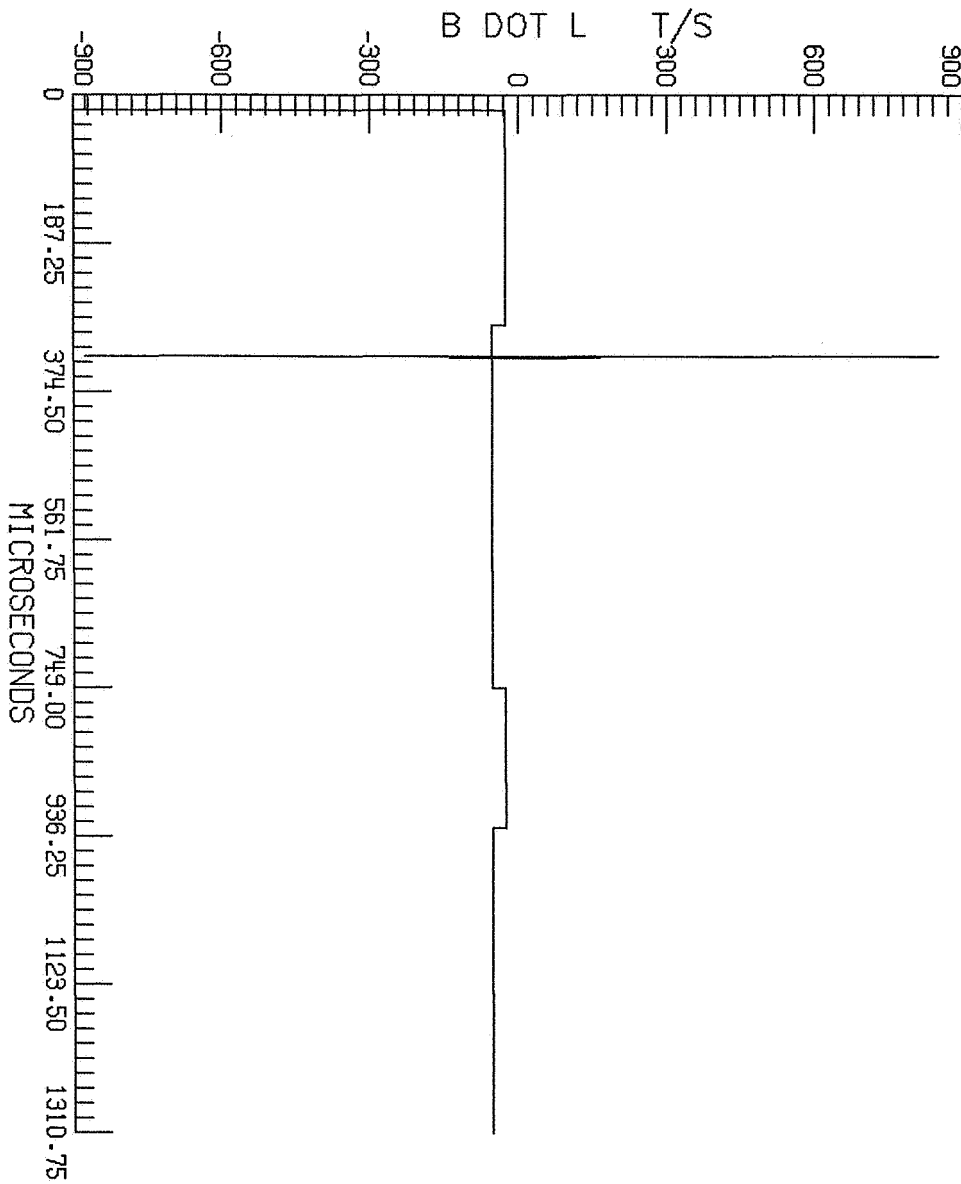


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TEST NO. 82-042

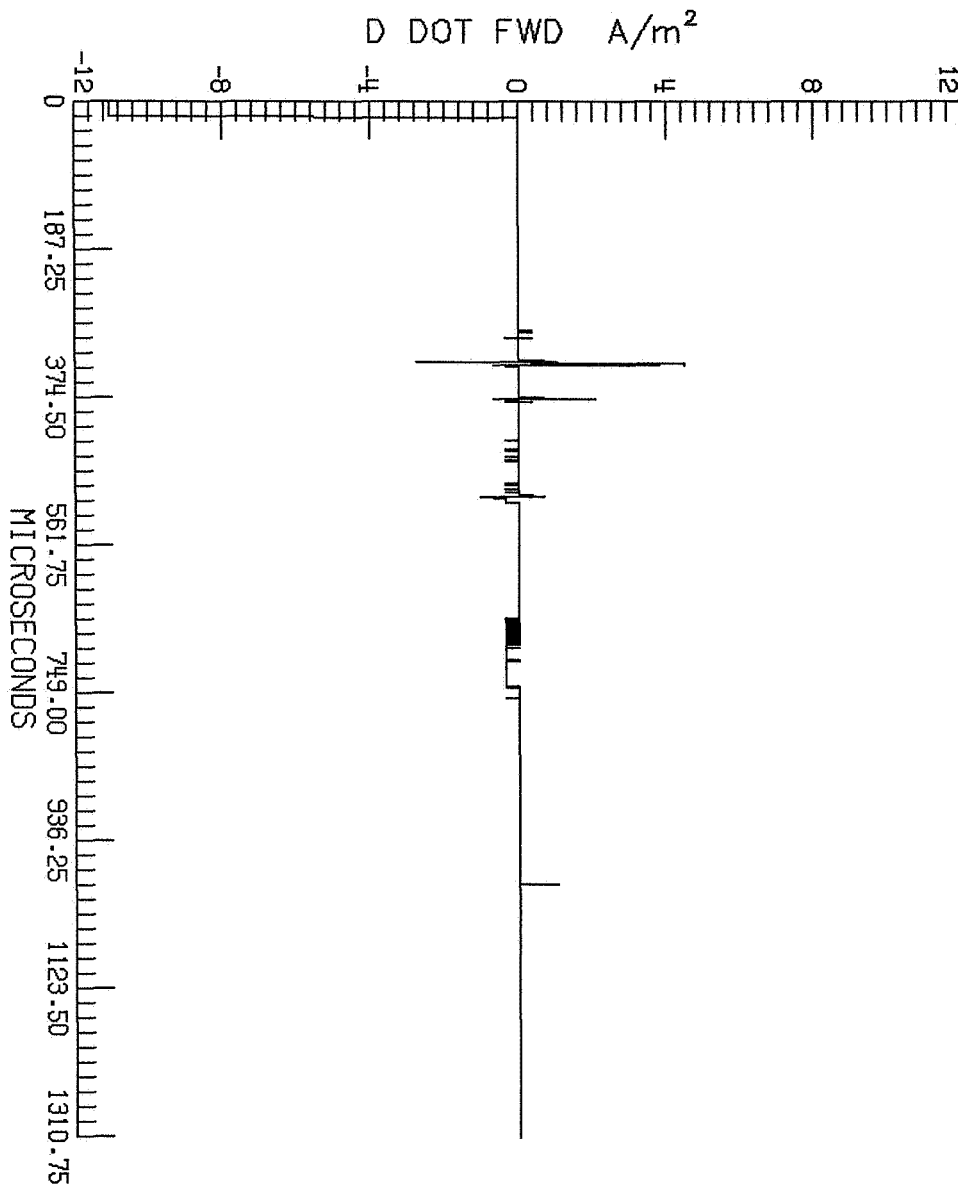
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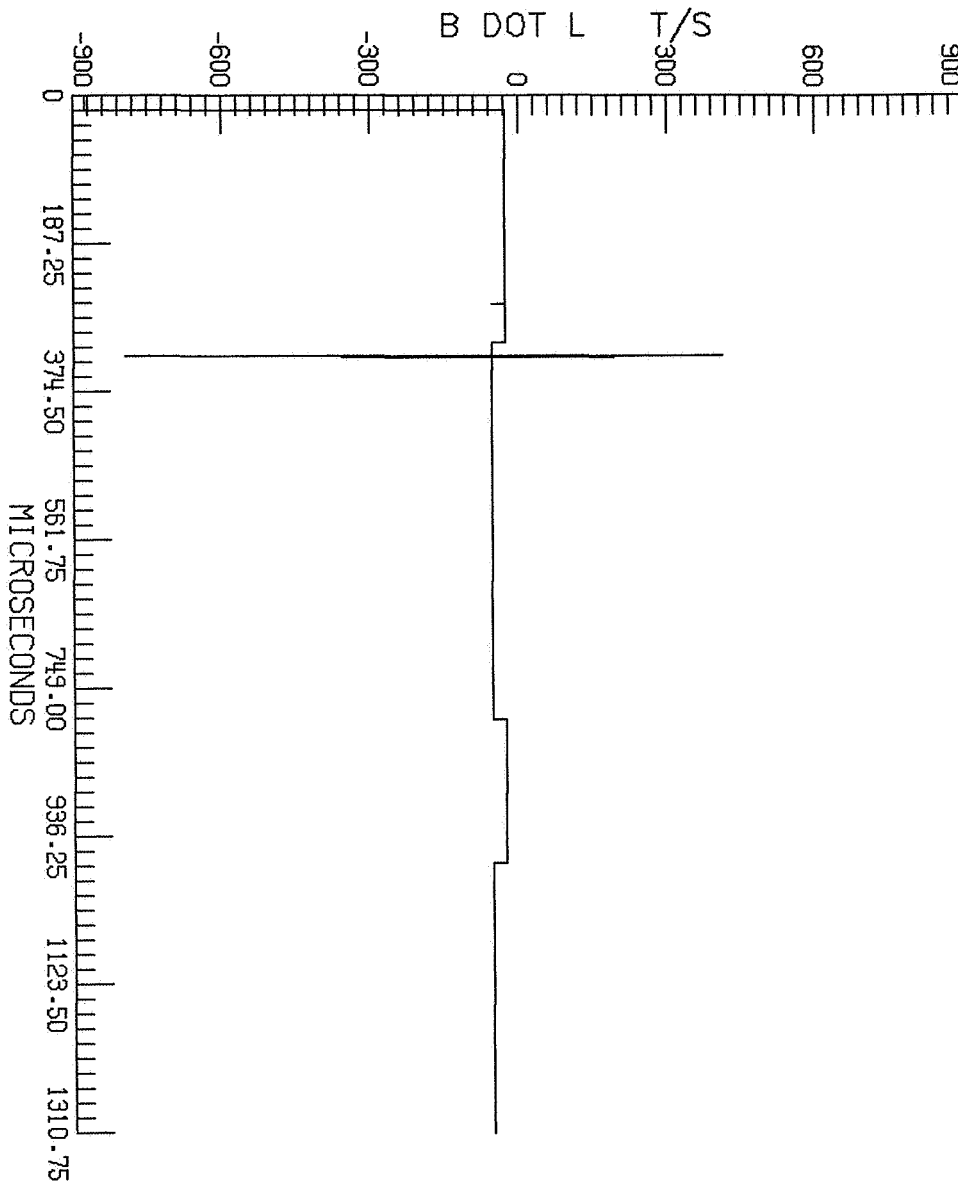
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F106 LIGHTNING/PCM/TK.8/THOMAS

TEST NO. 82-042

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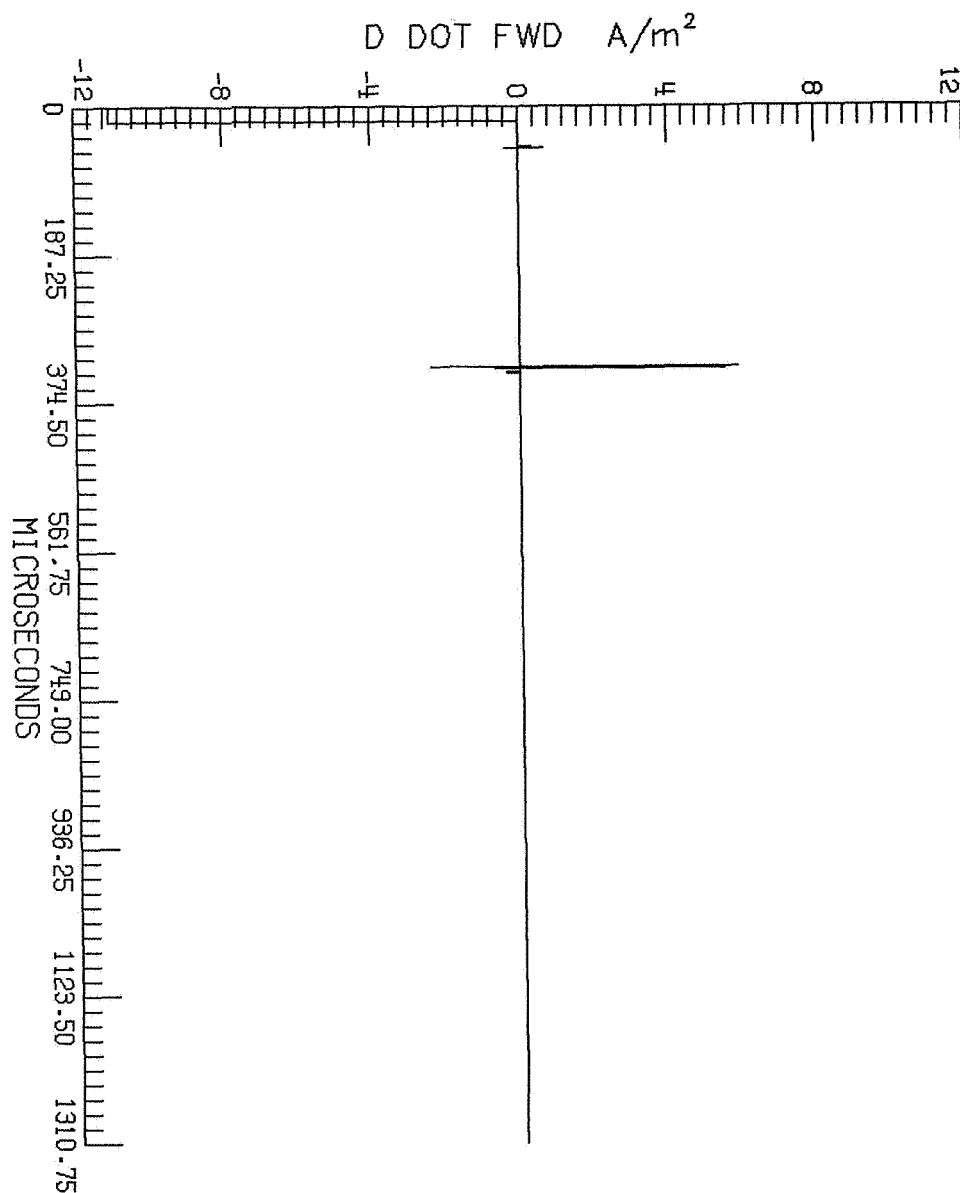


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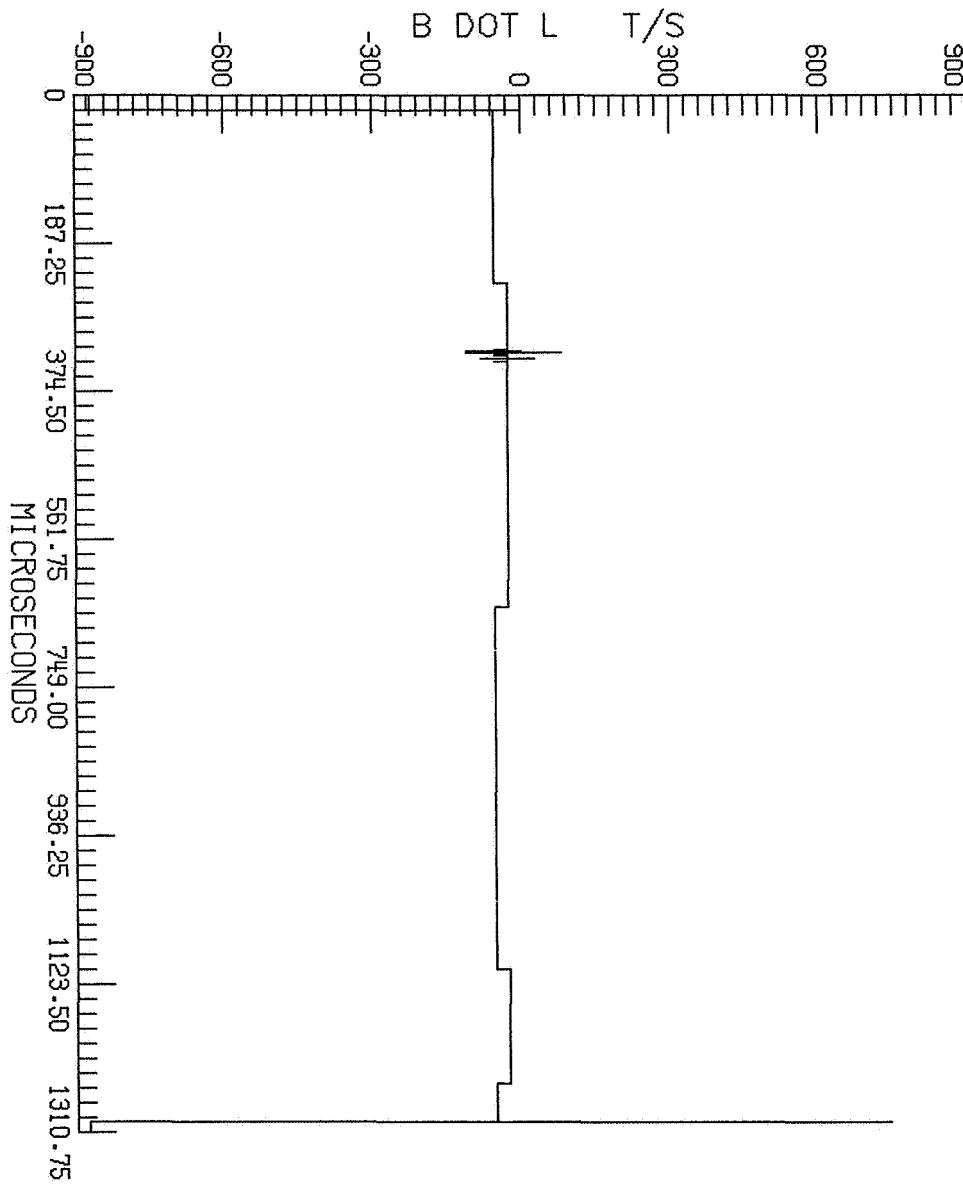
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F106 LIGHTNING/PCM/TK.8/THOMAS

TEST NO. 82-042

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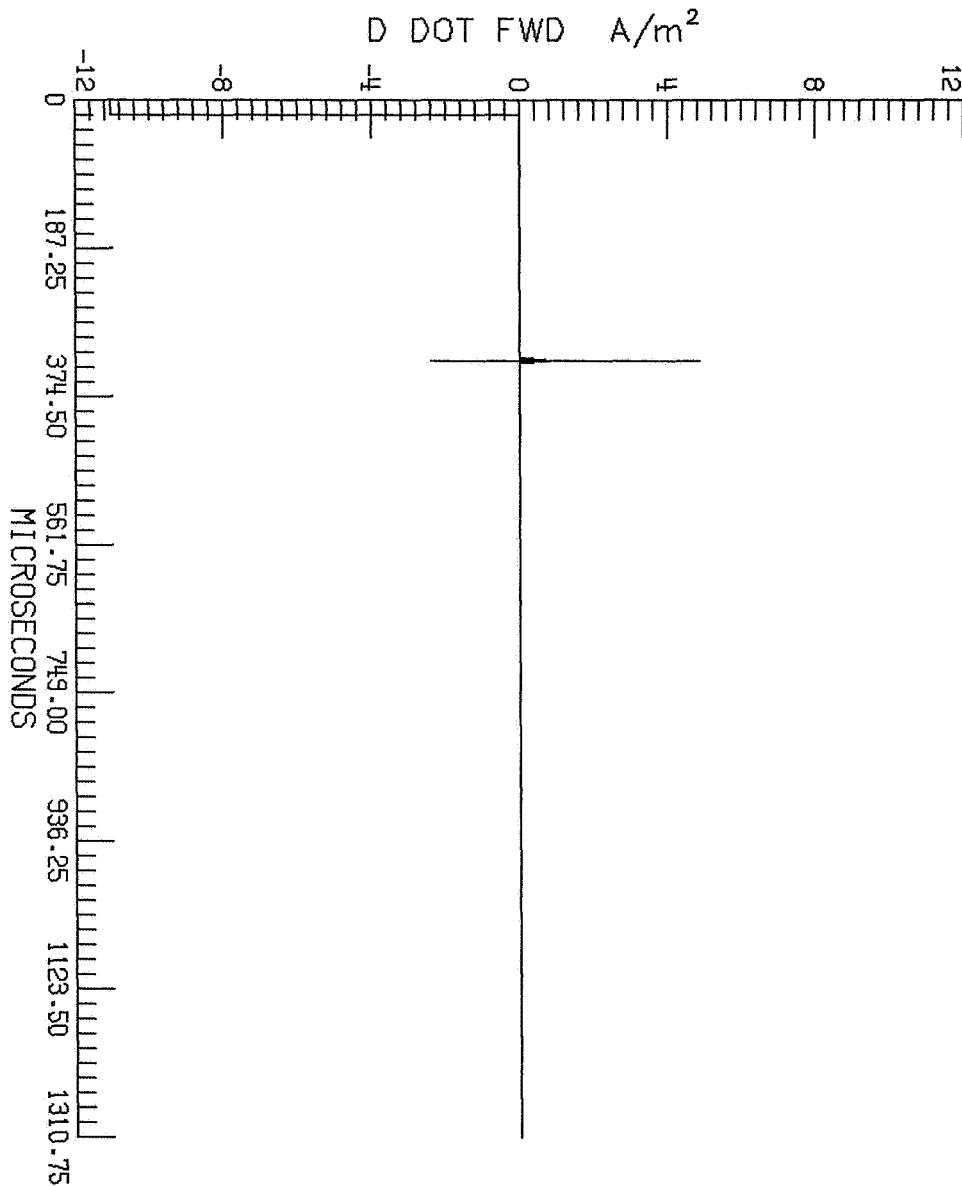


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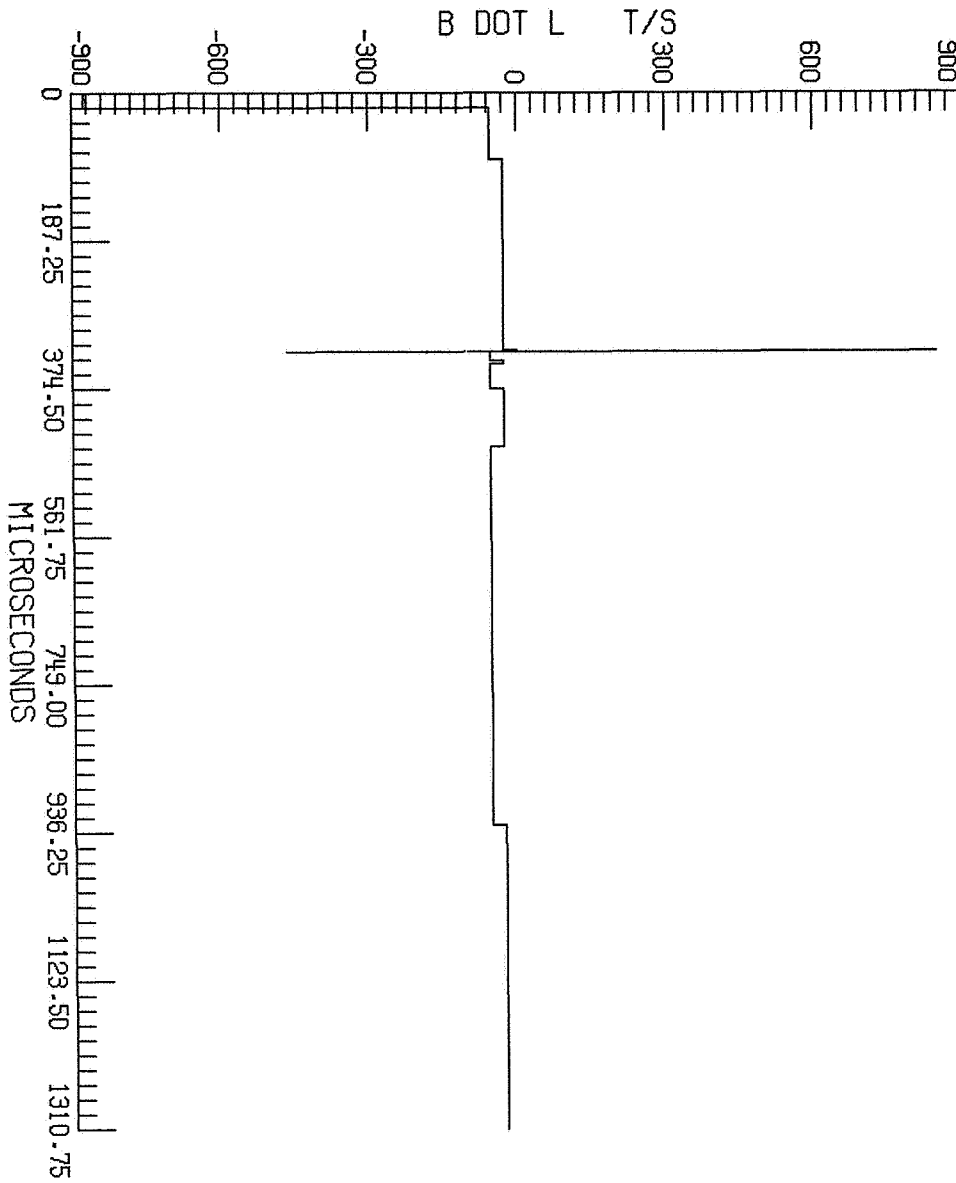


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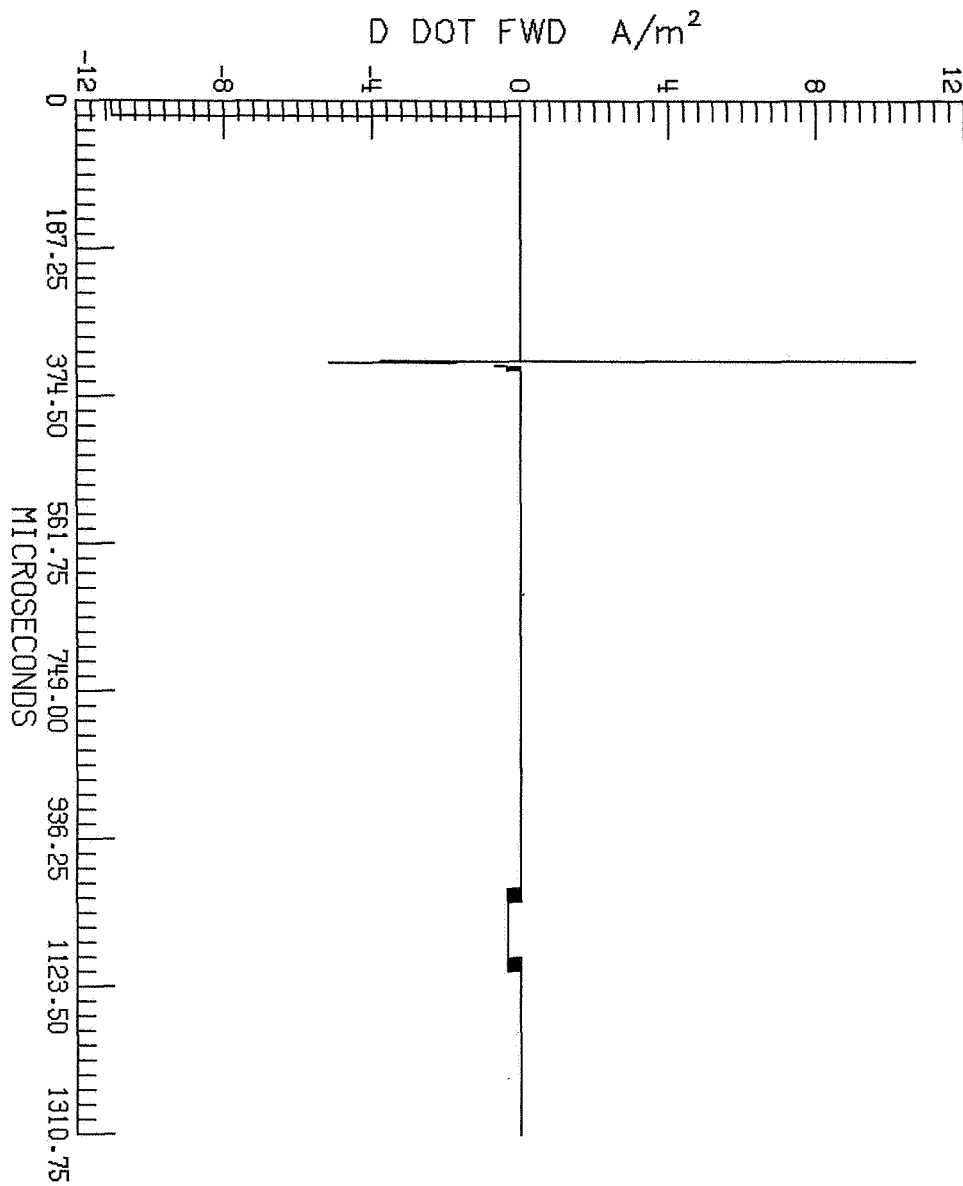
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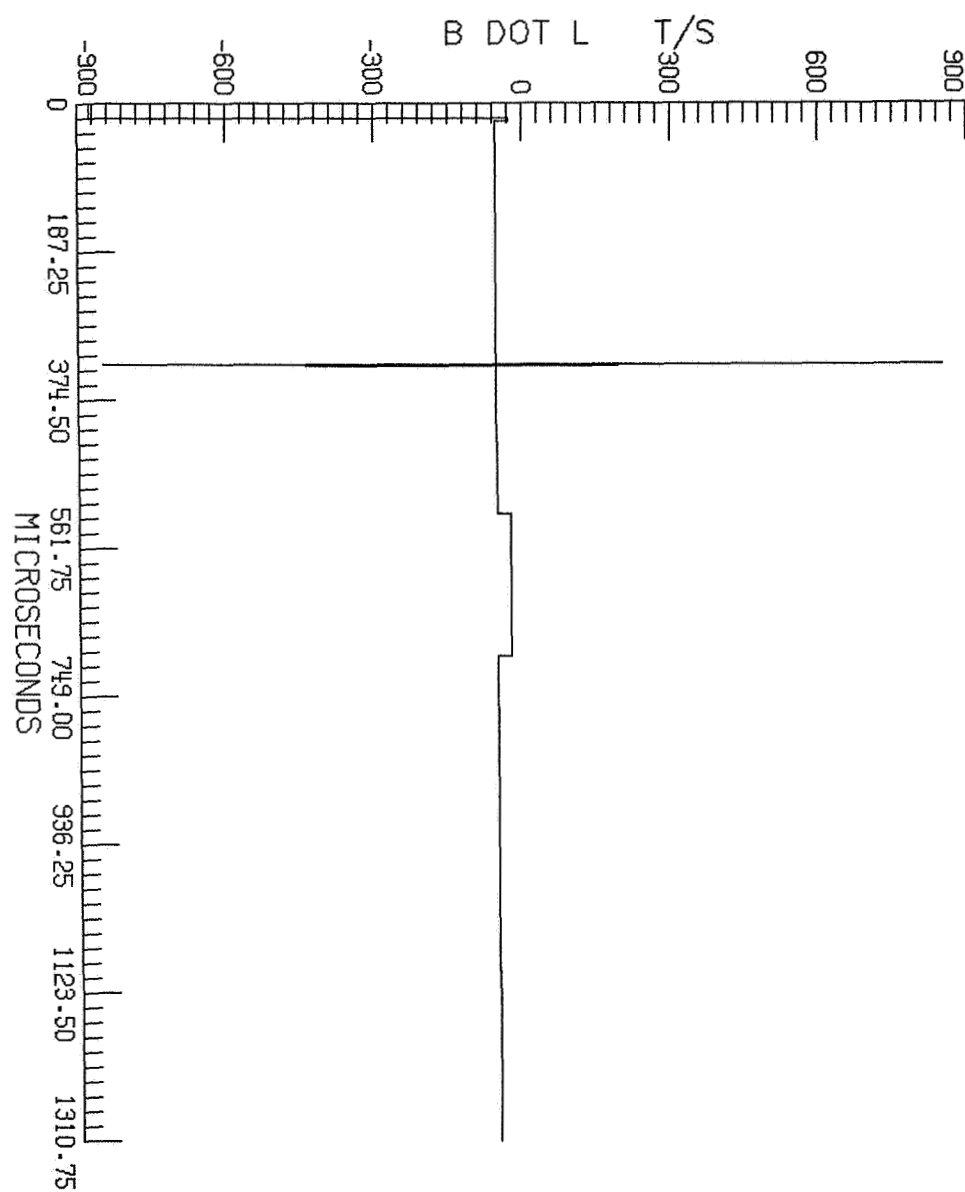


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TEST NO. 82-042

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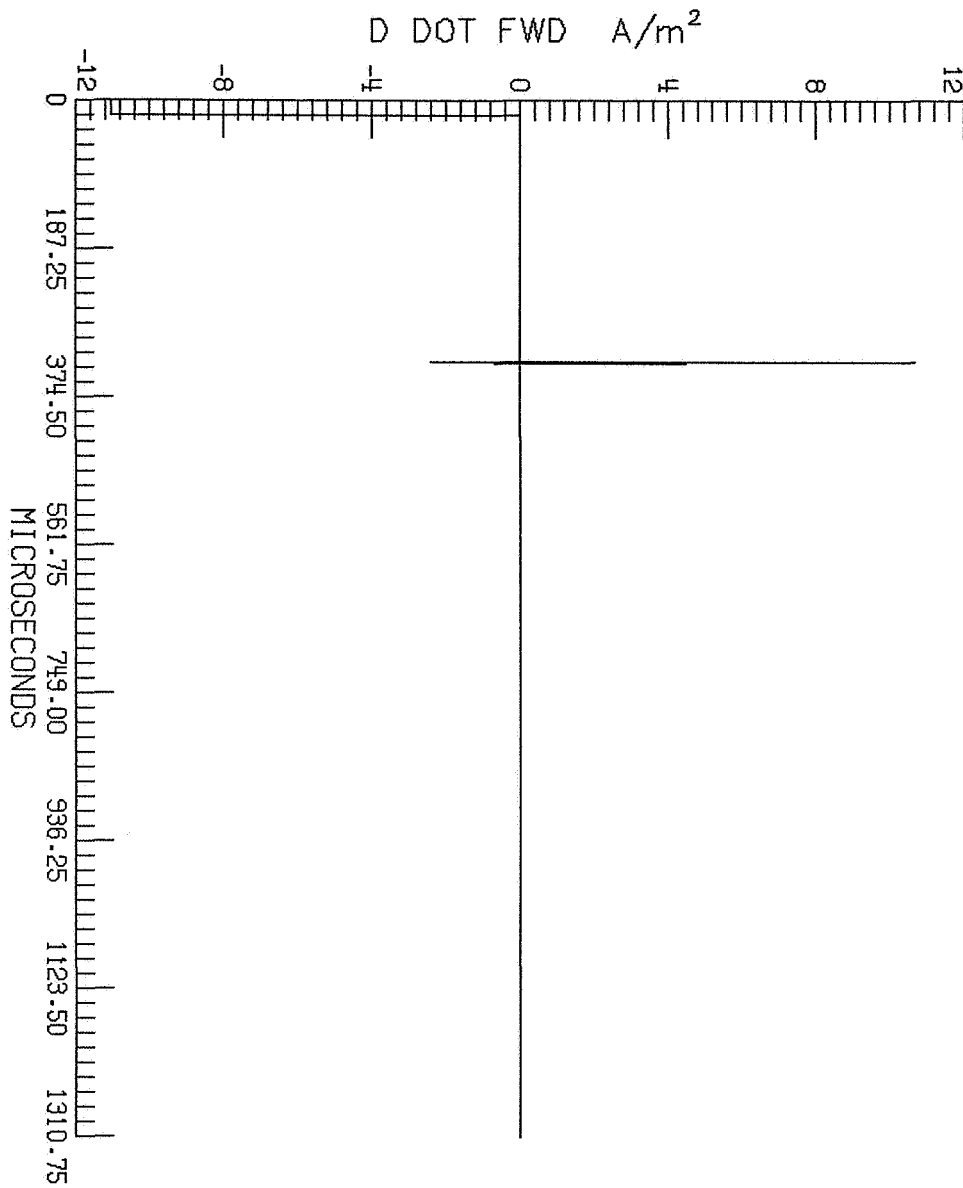


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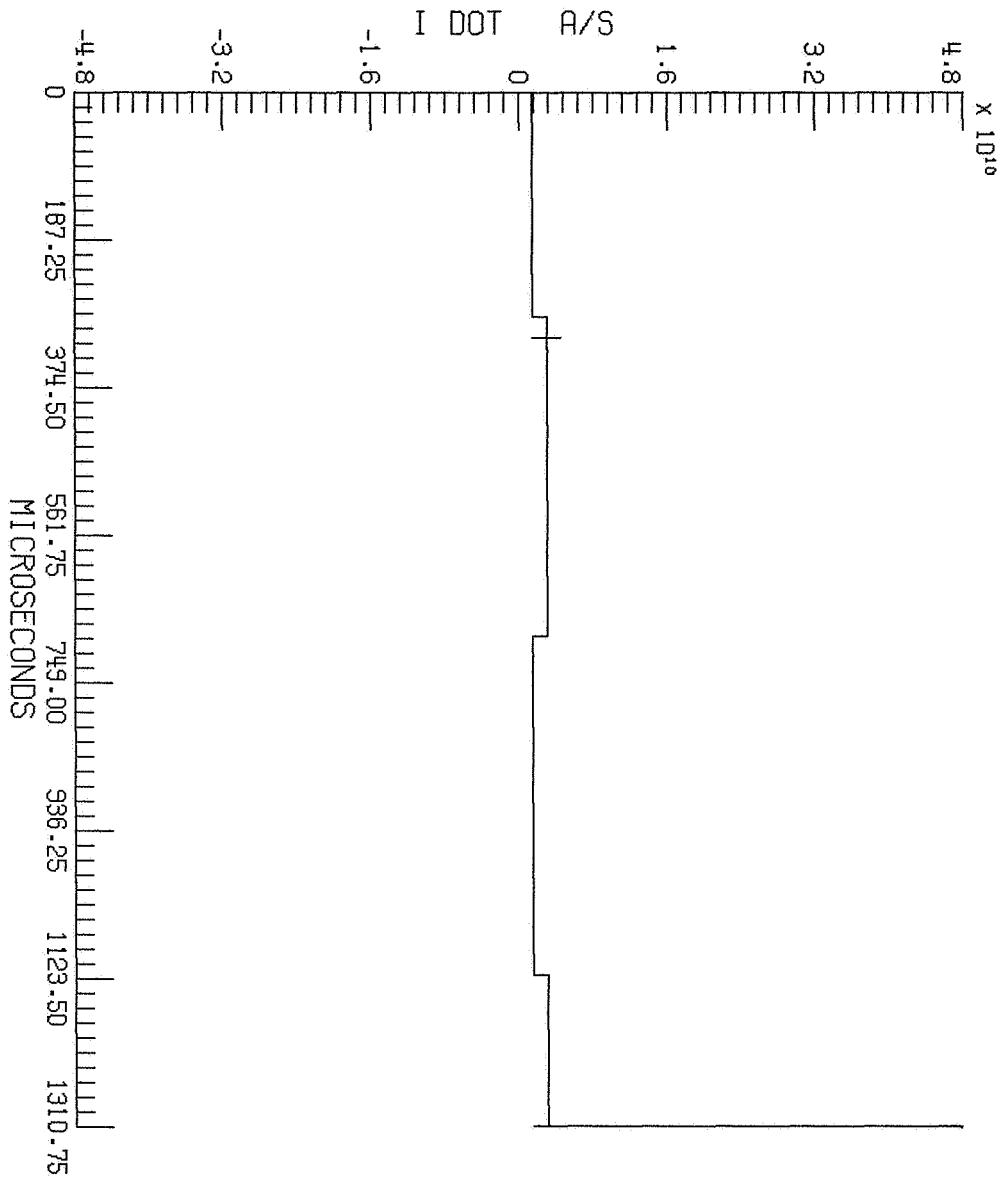
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F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-043

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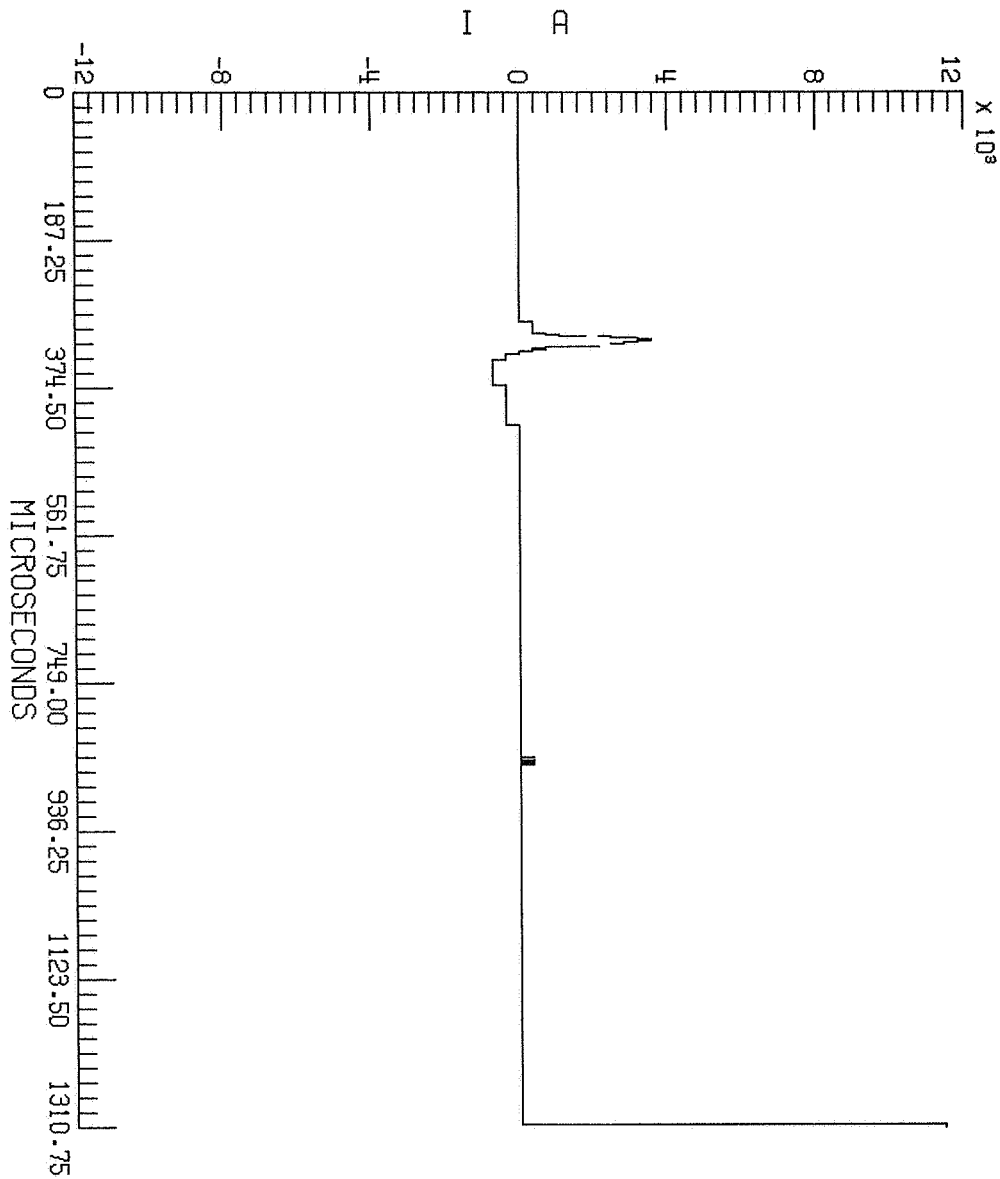


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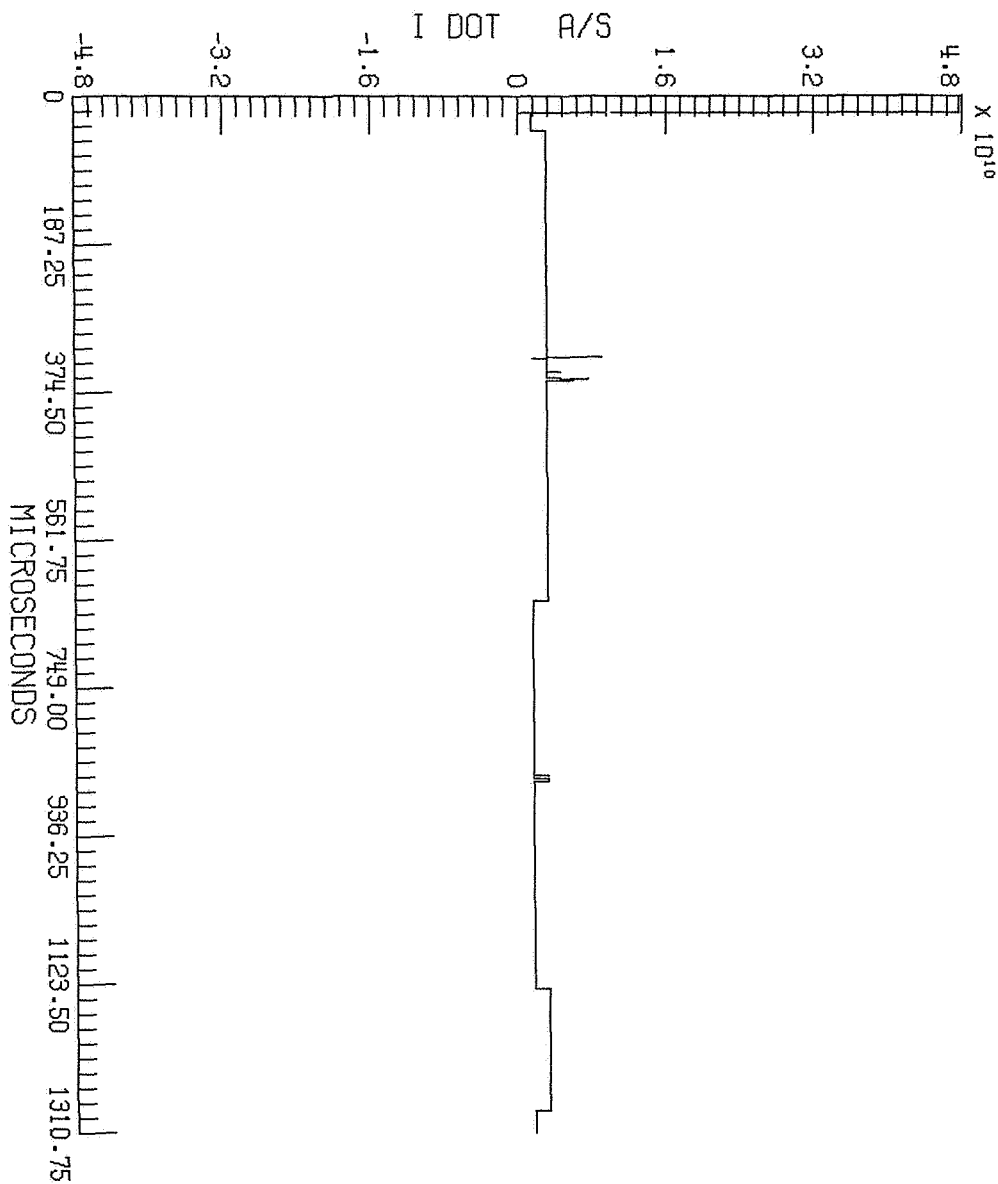


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TEST NO. 82-043

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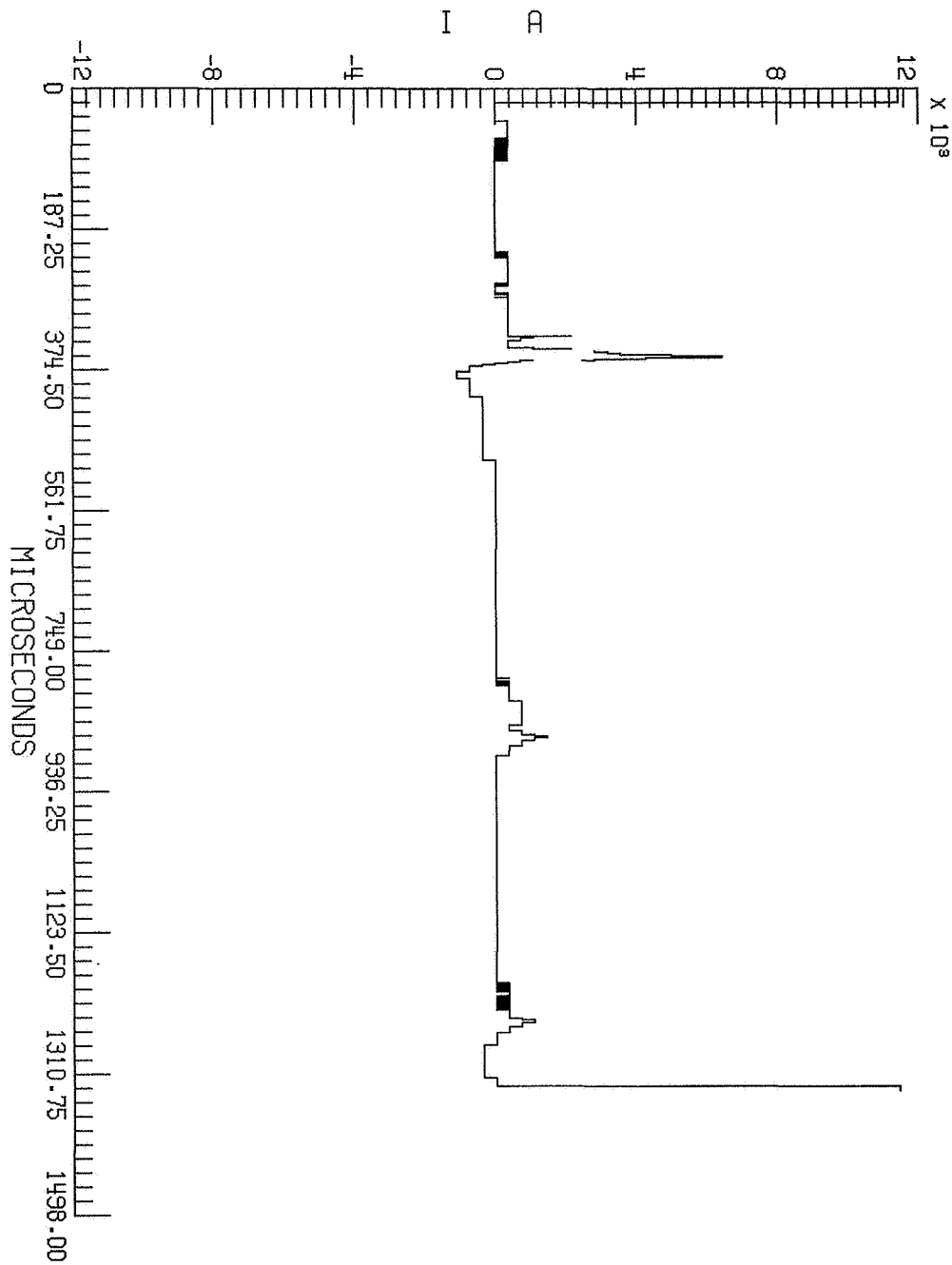


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TEST NO. 82-043

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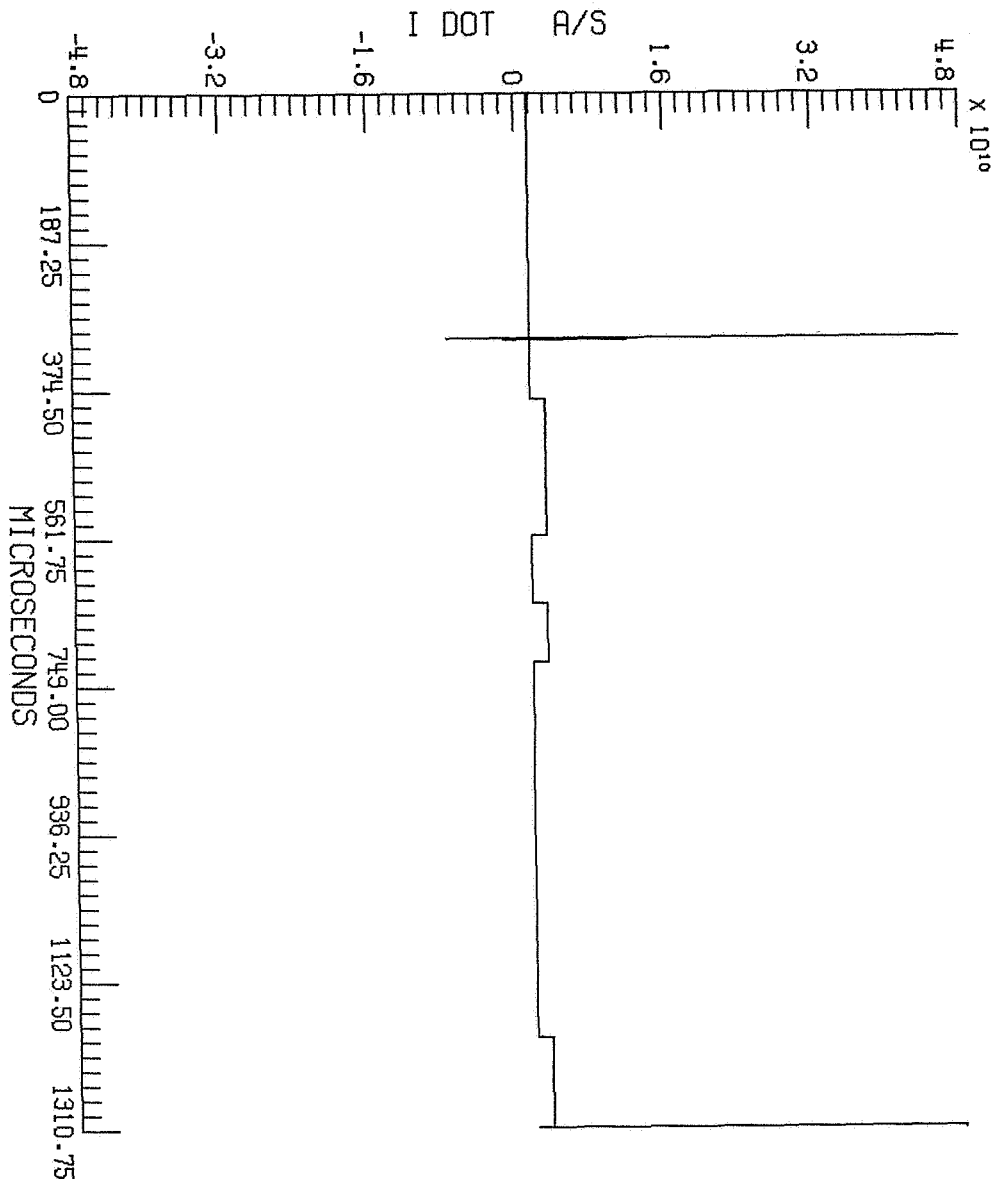


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TEST NO. 82-044

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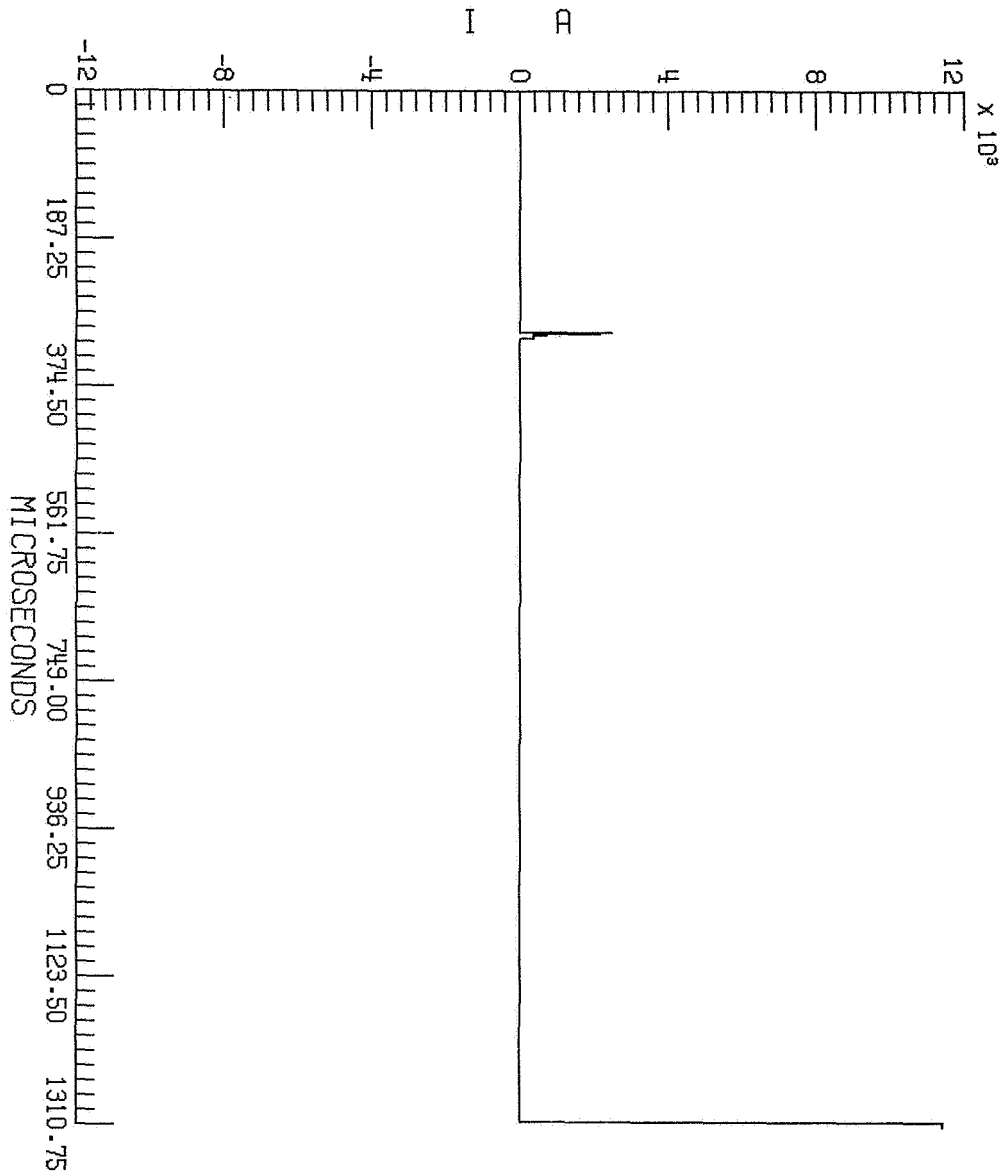


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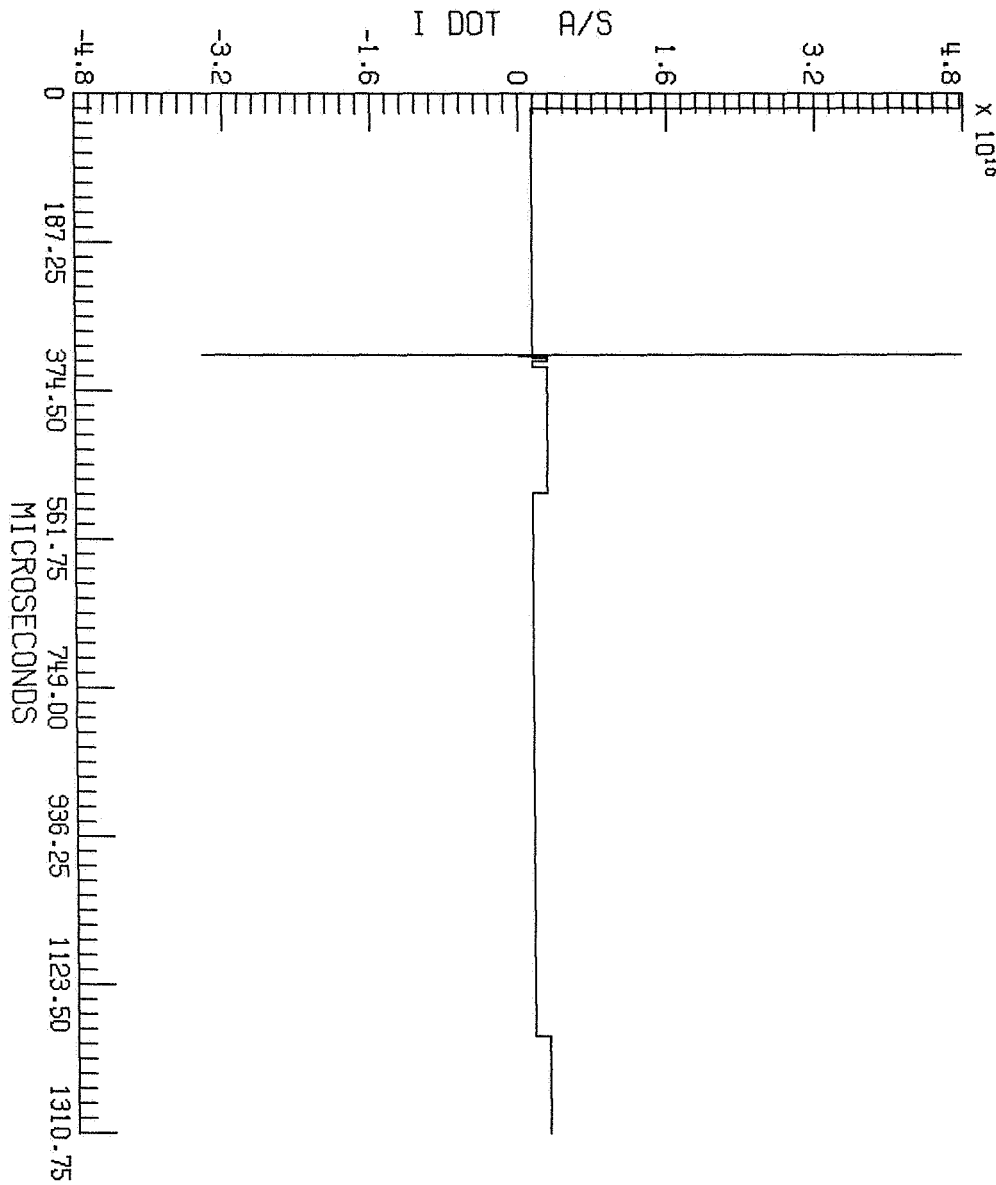
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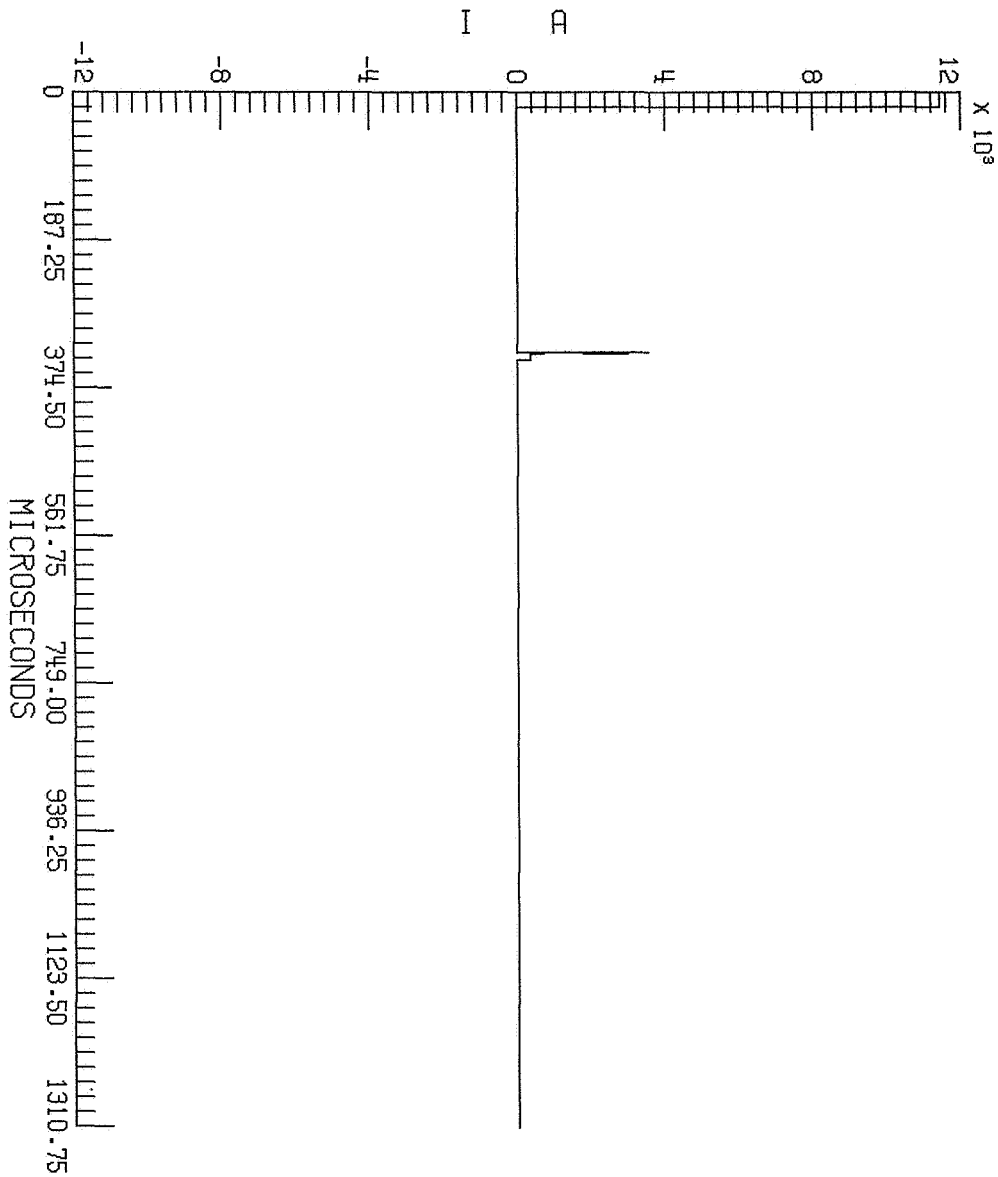


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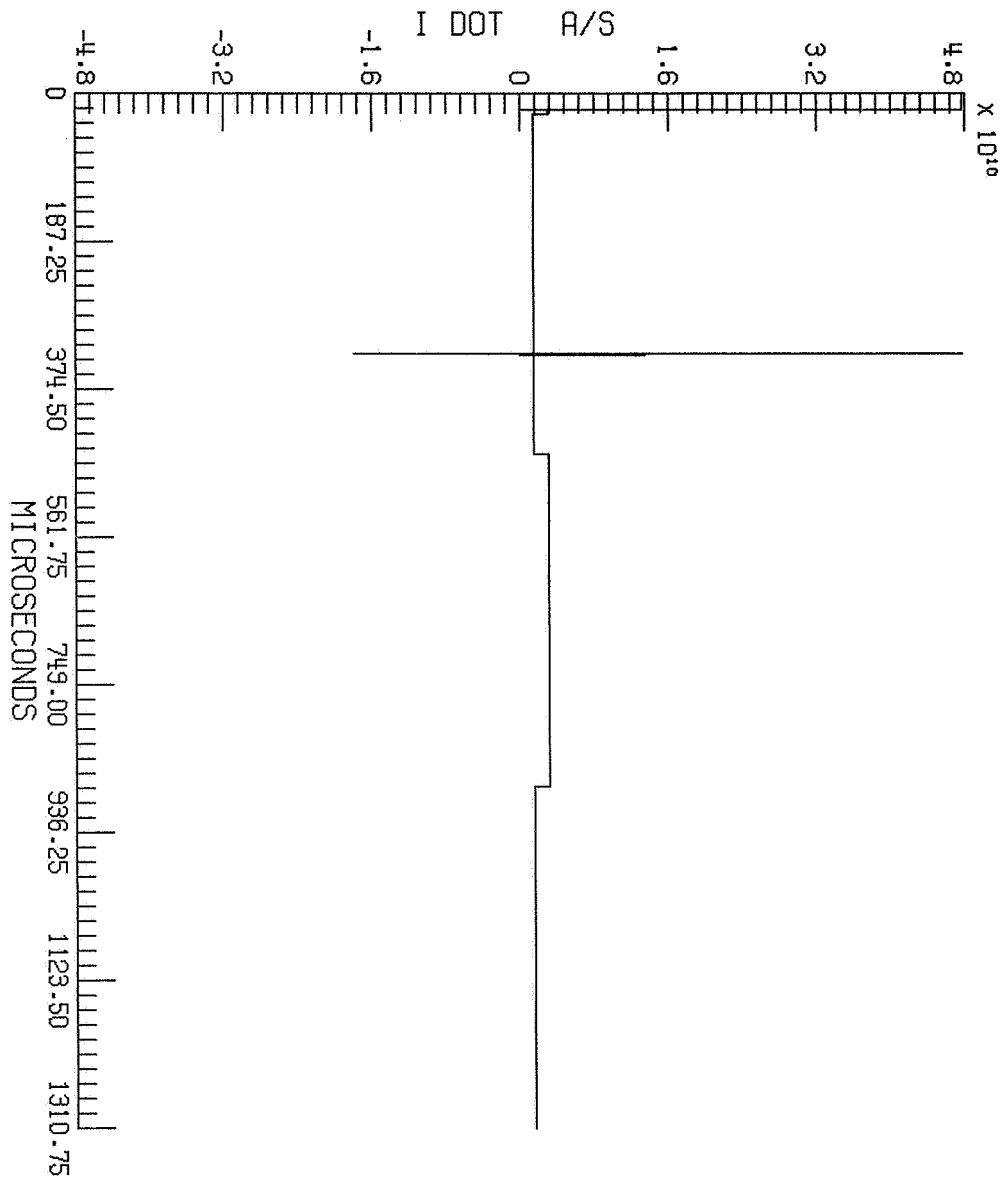
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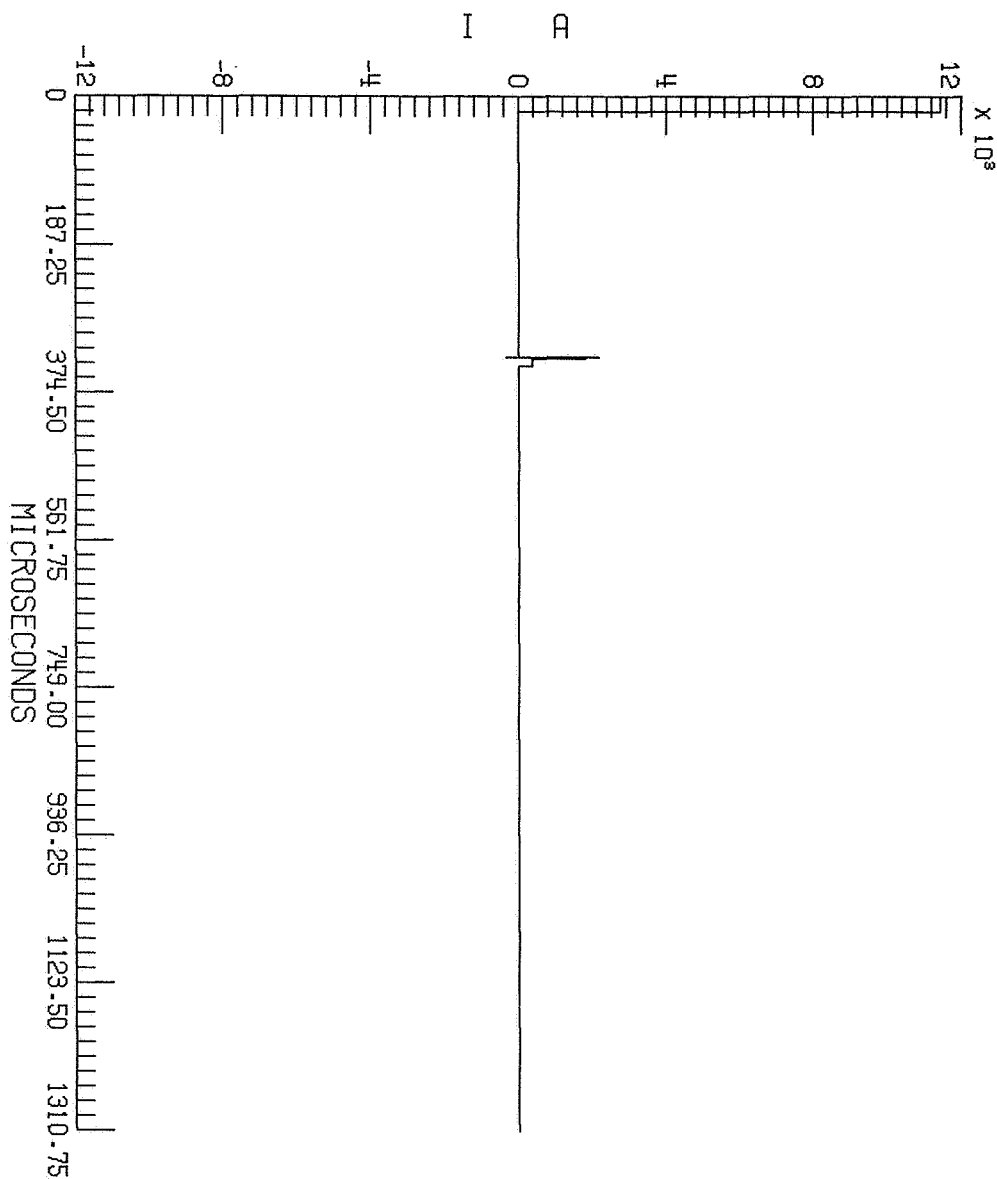


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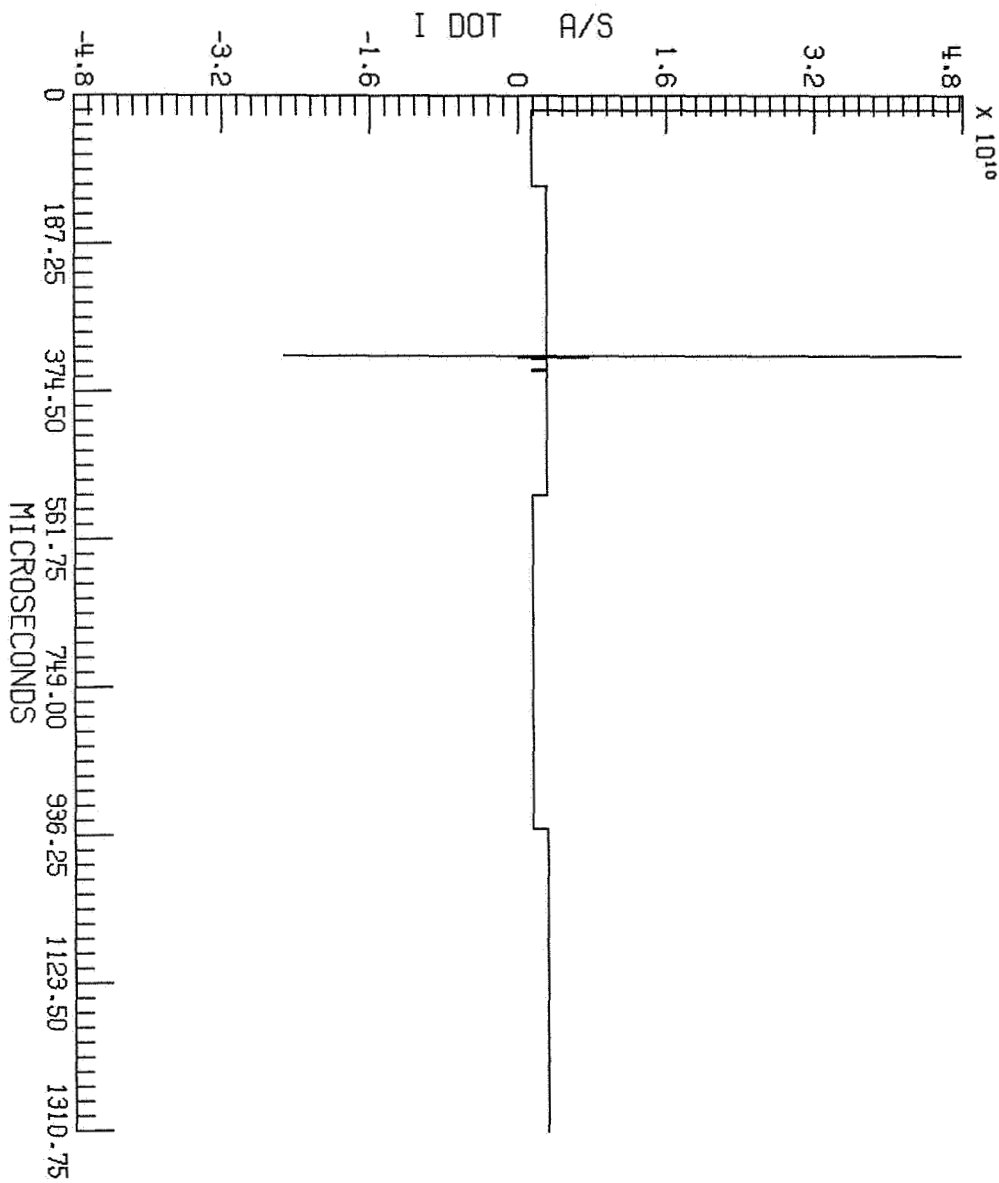


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TEST NO. 82-044

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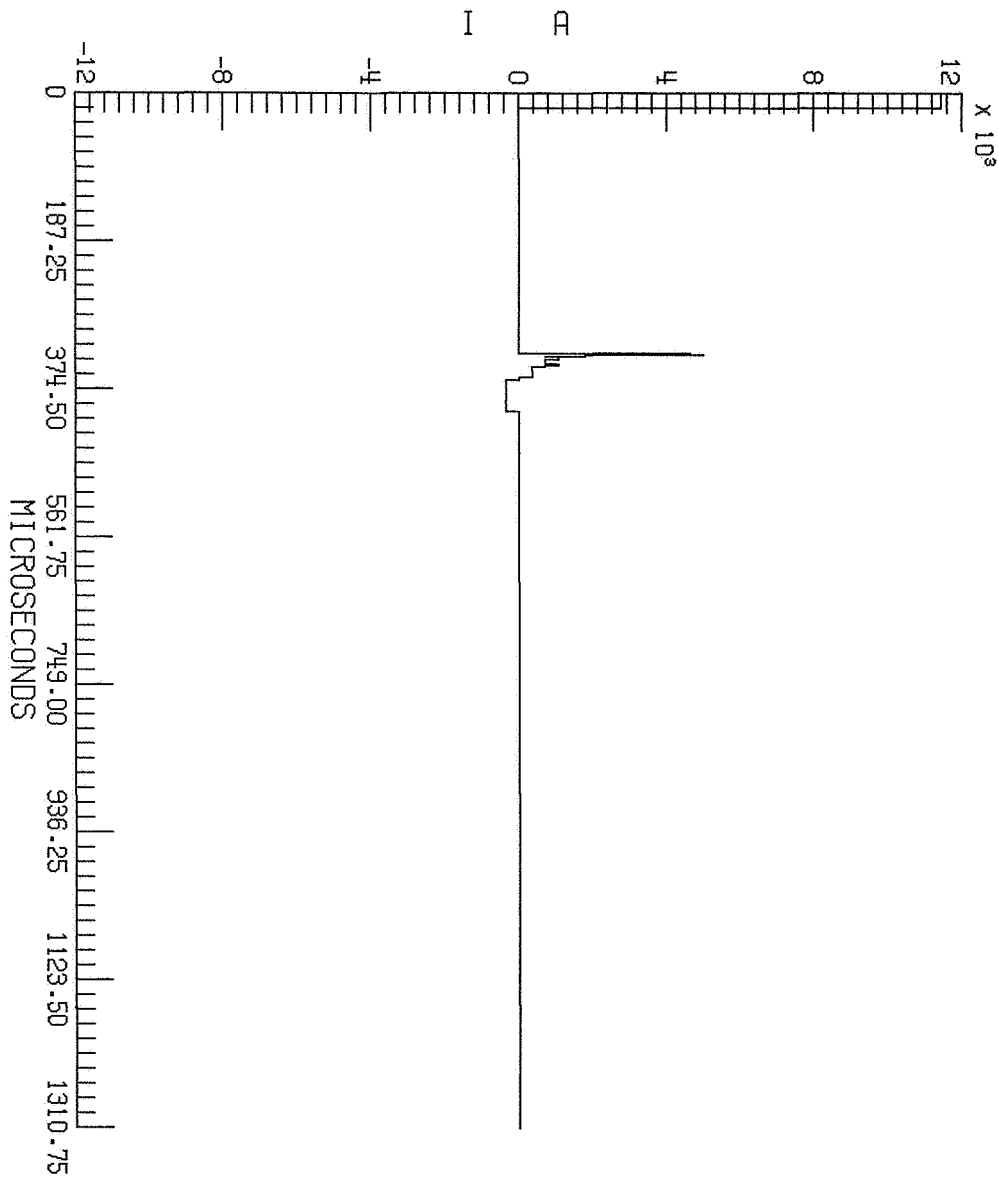


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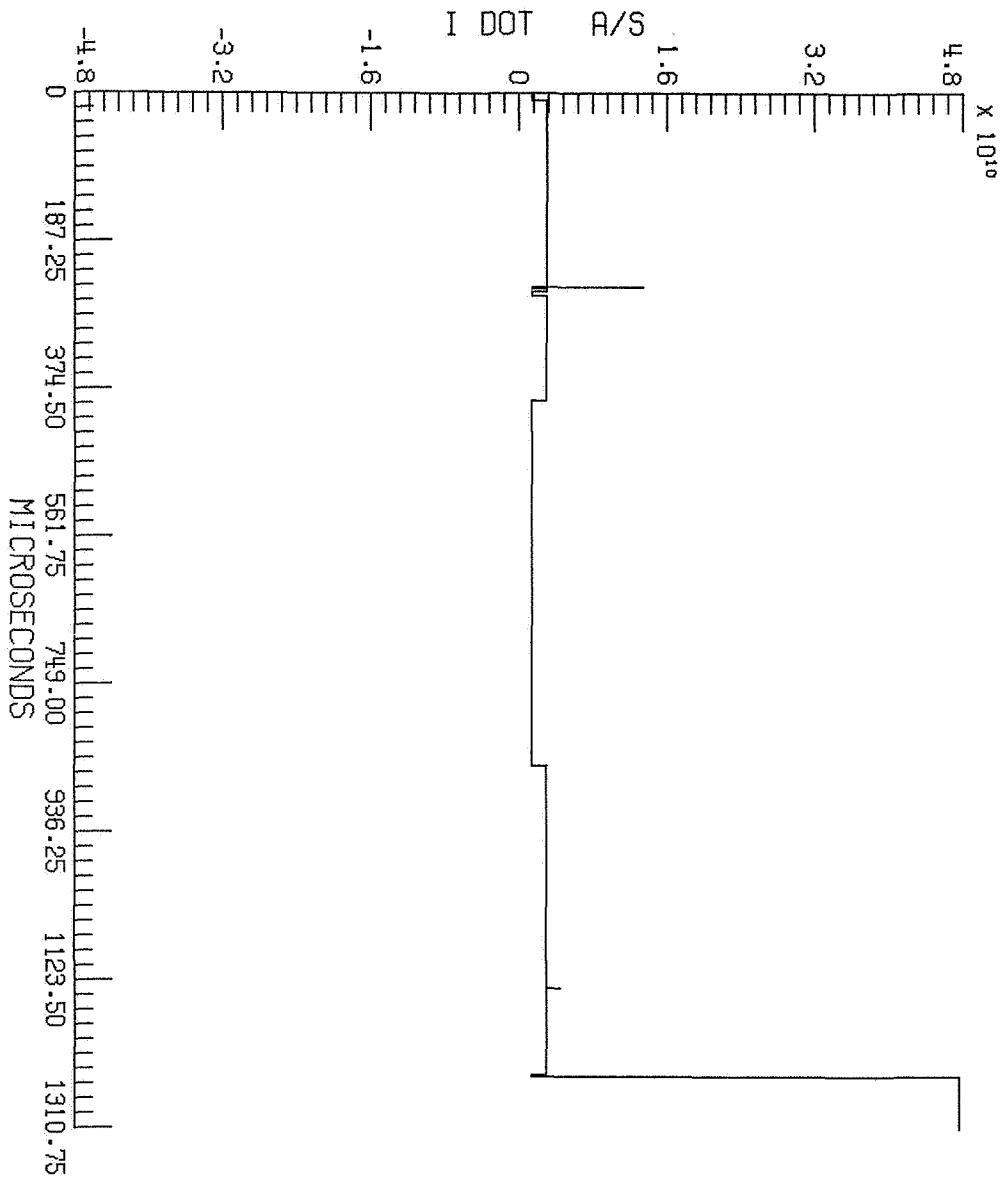


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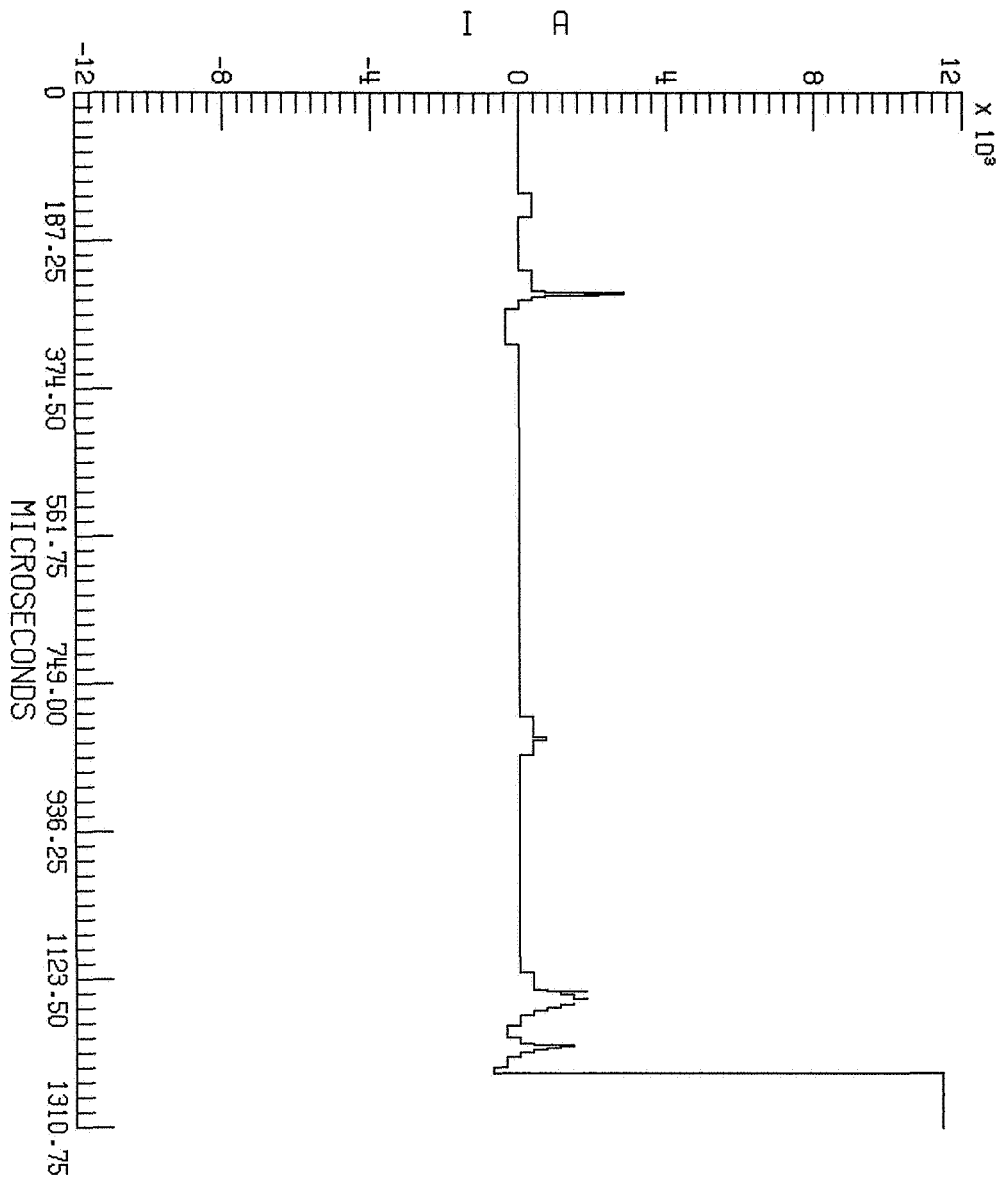
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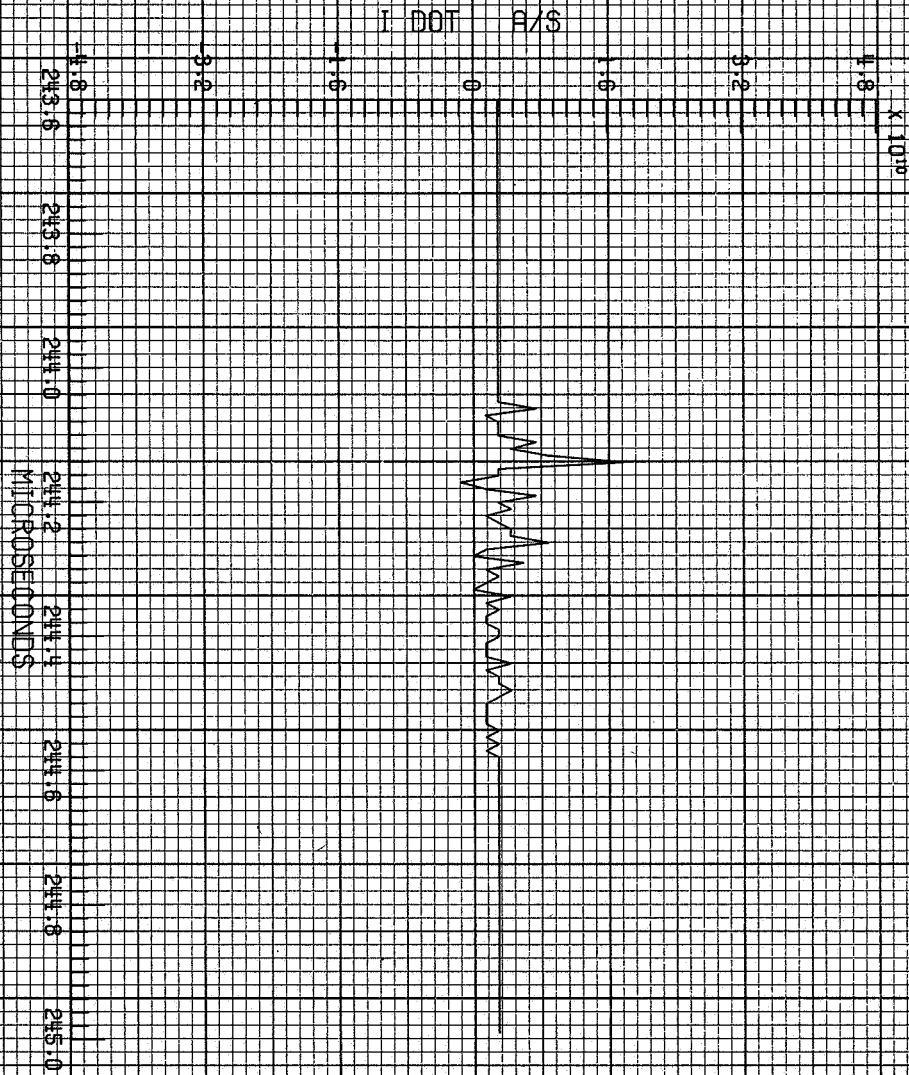


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F106/TK 8/82-010/THOMBS

TEST NO. 82-010

RUN NO. 2

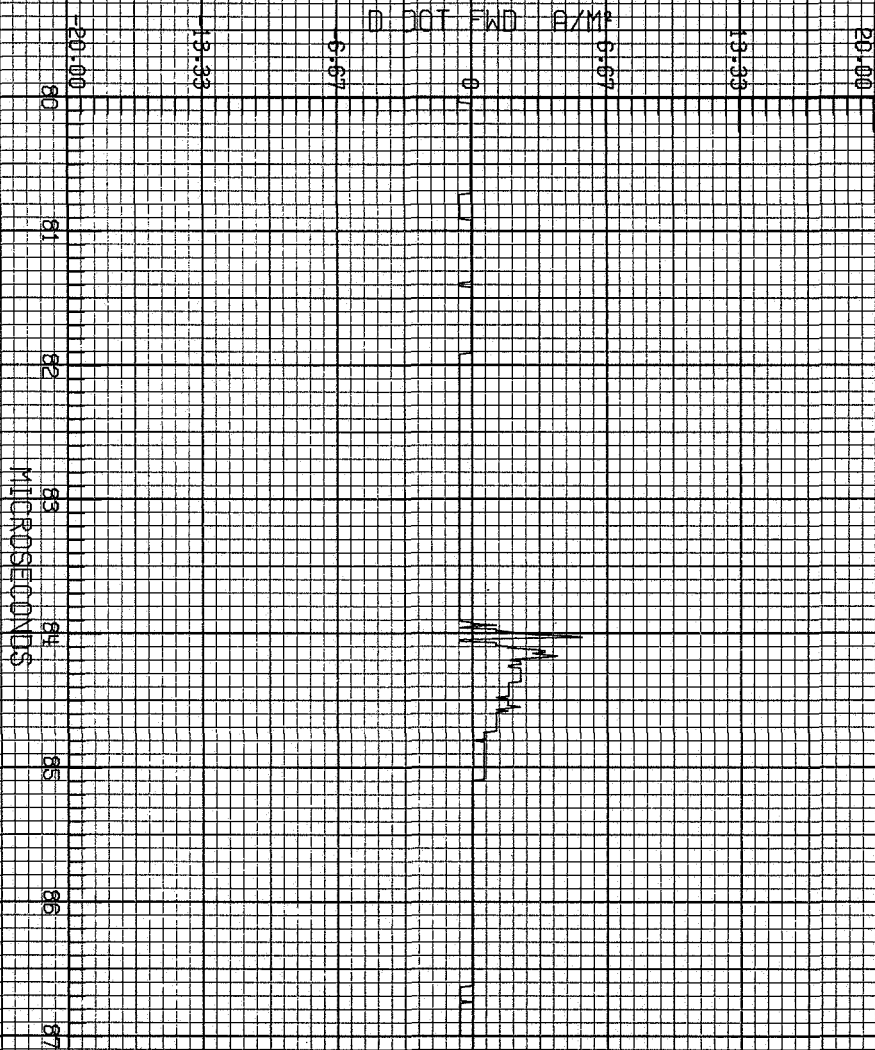


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F106/TK 10/82-010/THOMAS

TEST NO. 82-010

RUN NO. 2

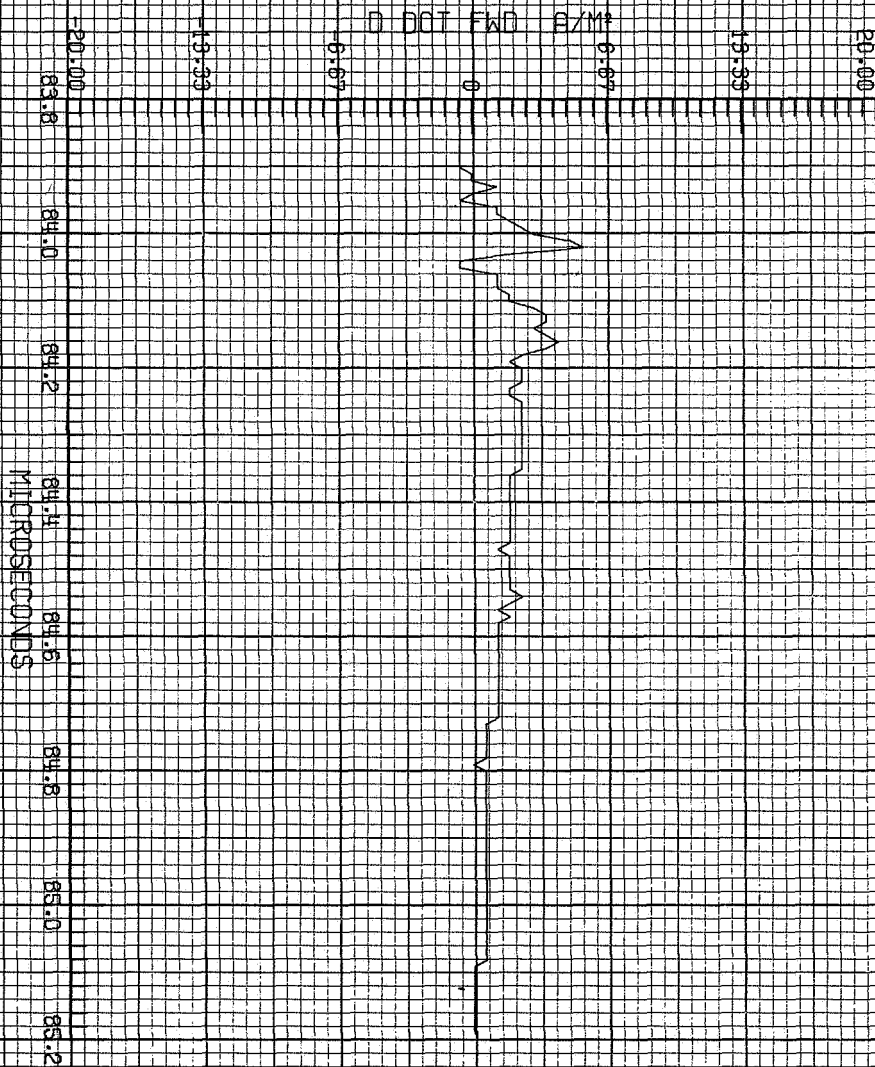


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F106/TK 10/82-010/THOMAS

TEST NO. 82-010

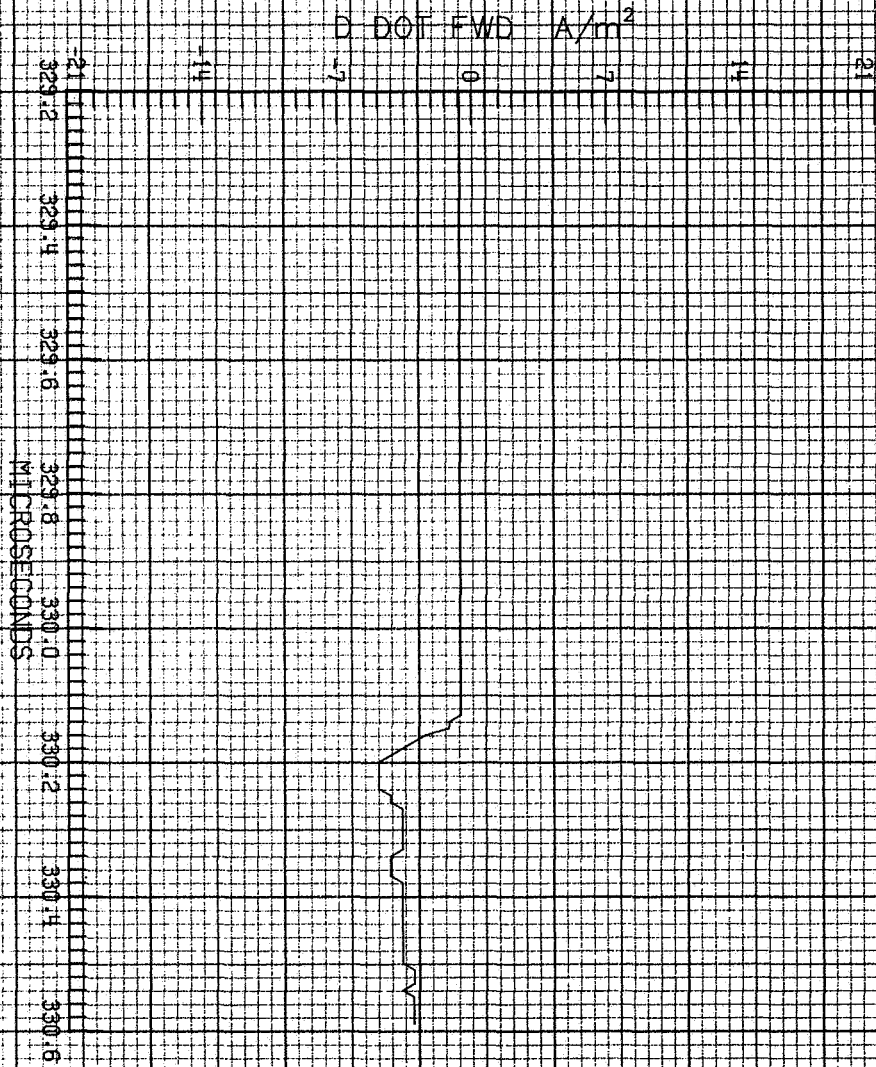
RUN NO. 2



F106/TK 10/82-010/THOMAS

TEST NO. 82-010

RUN NO. 2



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F106/TK 10/82-010/THOMAS

TEST NO. 82-010

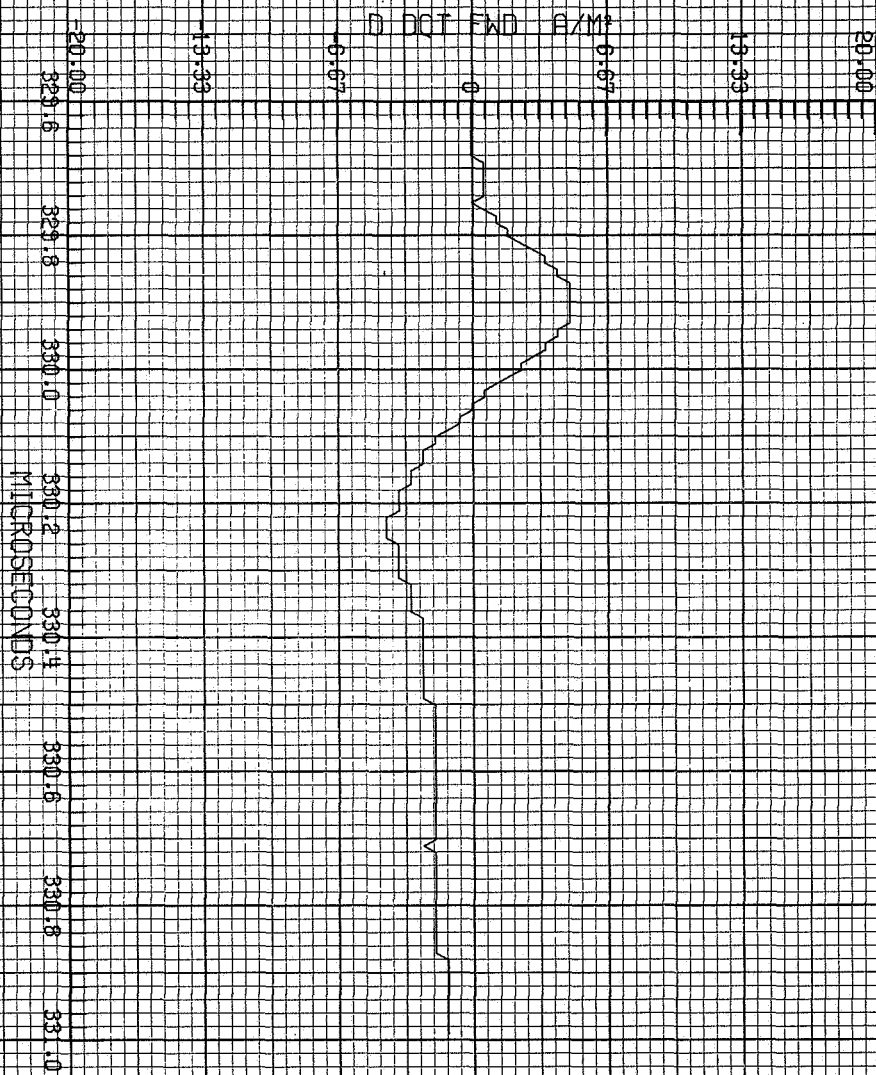
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F106/TK 10/82-010/THOMAS

TEST NO. 82-010

RUN NO. 3

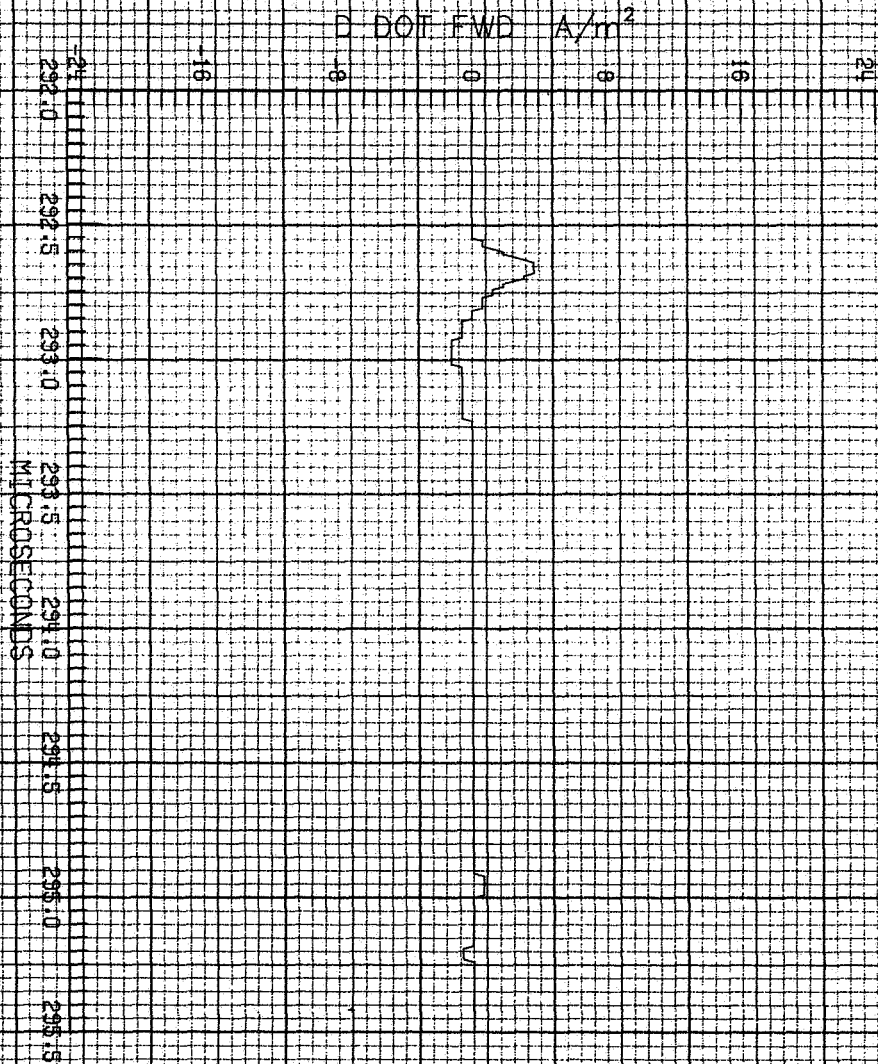


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F106 LIGHTNING/TK-10/M.THOMAS

TEST NO. 82-013

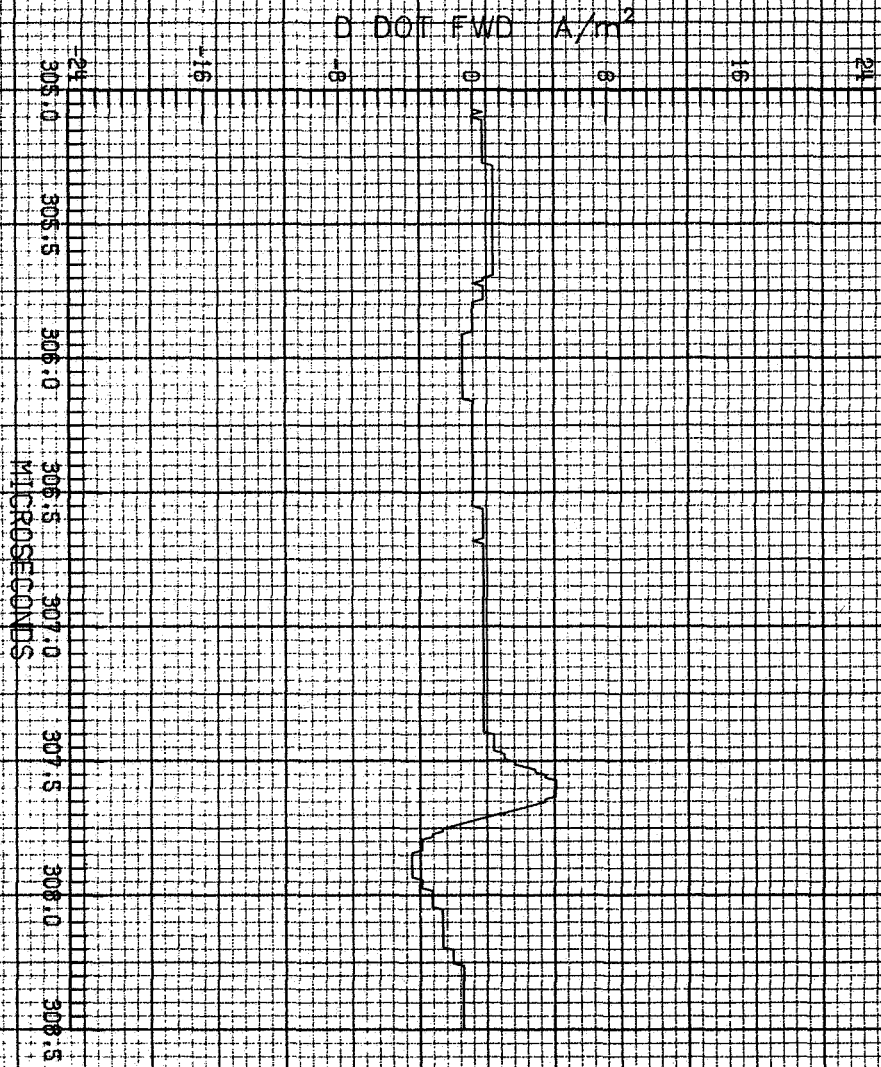
RUN NO. 1



F106 LIGHTNING/TK.10/M.THOMAS

TEST NO. 82-013

RUN NO. 1



F106 LIGHTNING/TK.08/M.THOMAS

TEST NO. 82-013

RUN NO. 2

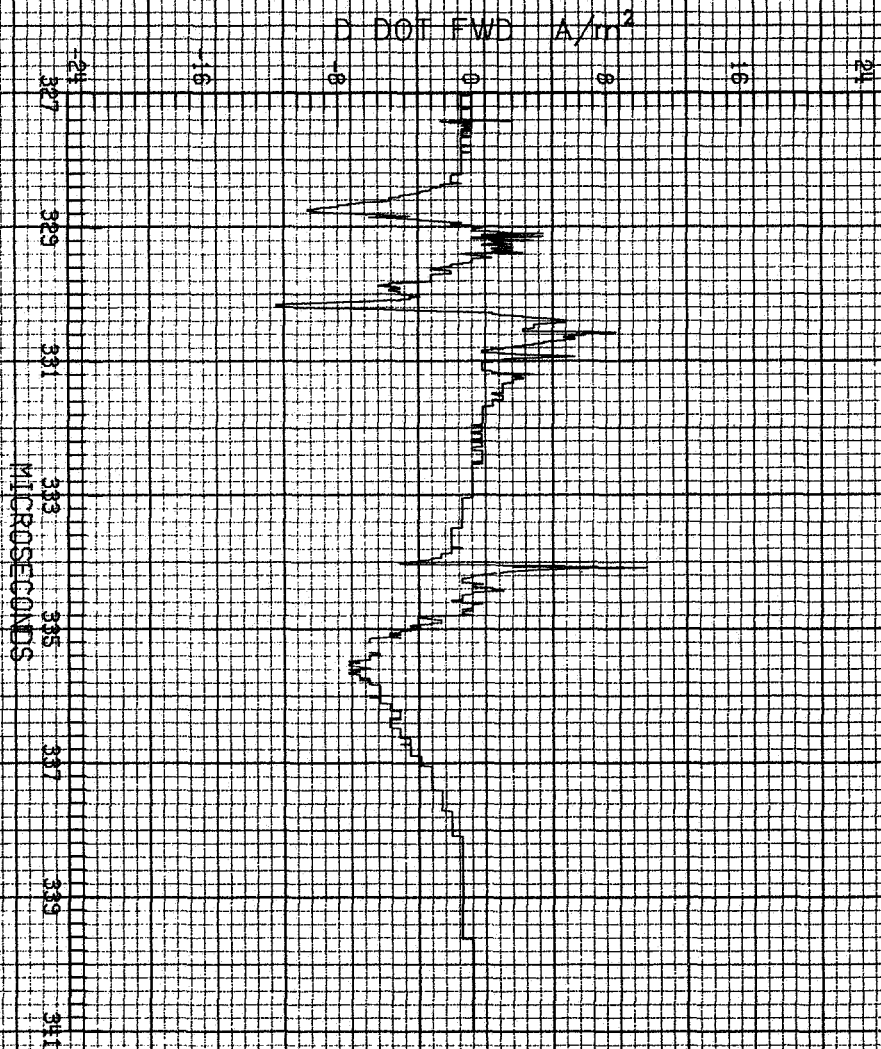


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F106 LIGHTNING/TK.10/M.THOMAS

TEST NO. 82-013

RUN NO. 3

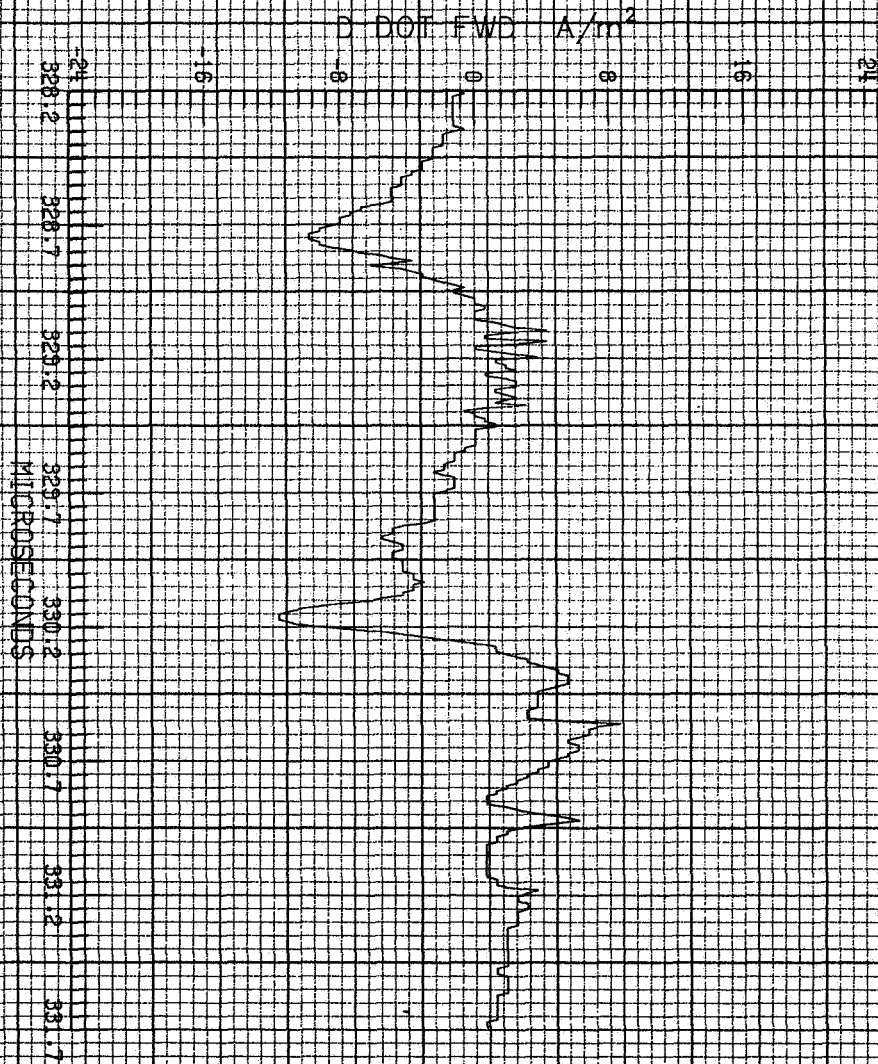


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TEST NO. 82-013

RUN NO. 3

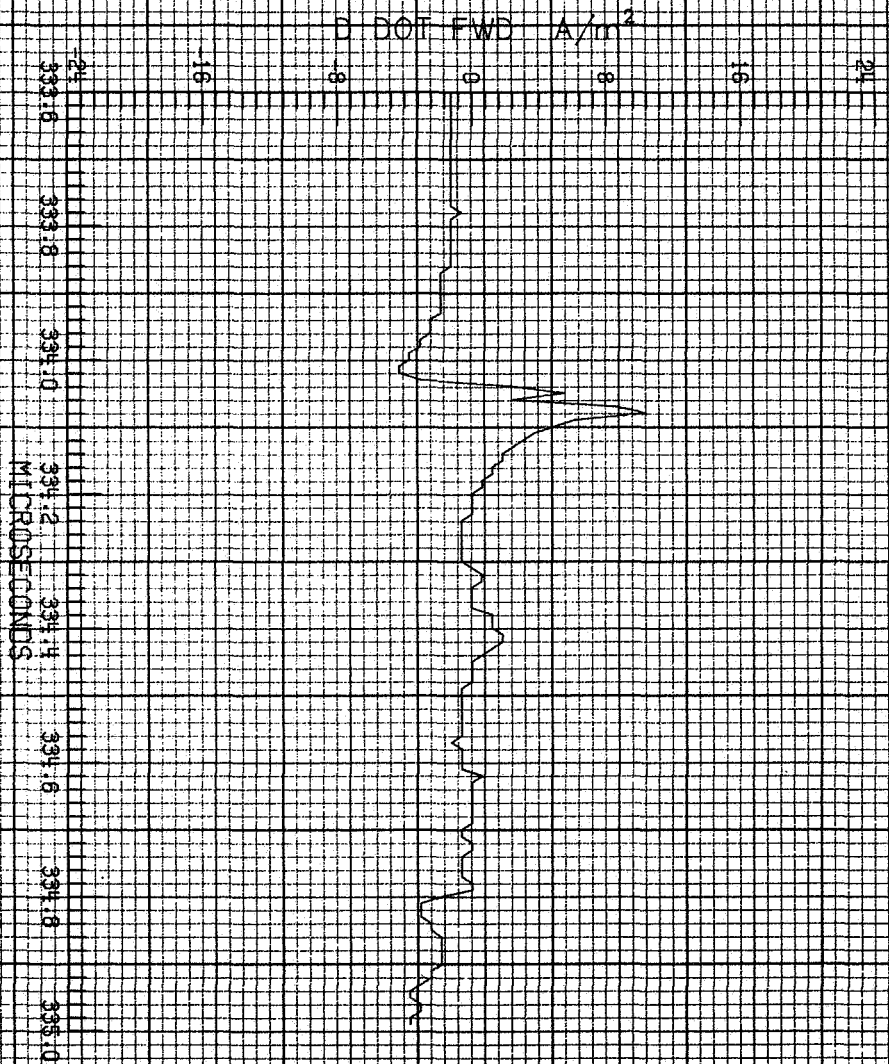


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TEST NO. 82-013

RUN NO. 3

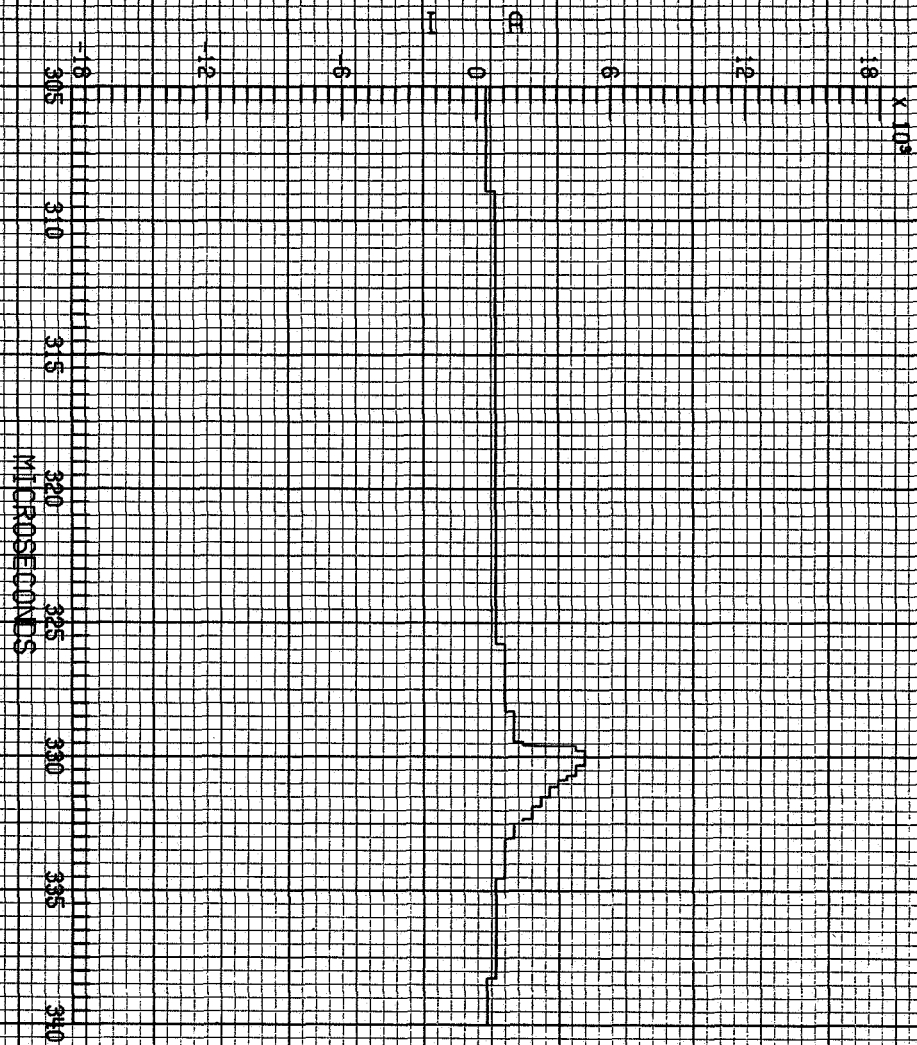


C-3

F106 LIGHTNING/TK.08/M.THOMAS

TEST NO. 82-013

RUN NO. 3



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F106 LIGHTNING/TK-08/M.THOMAS

TEST NO. 82-013

RUN NO. 4

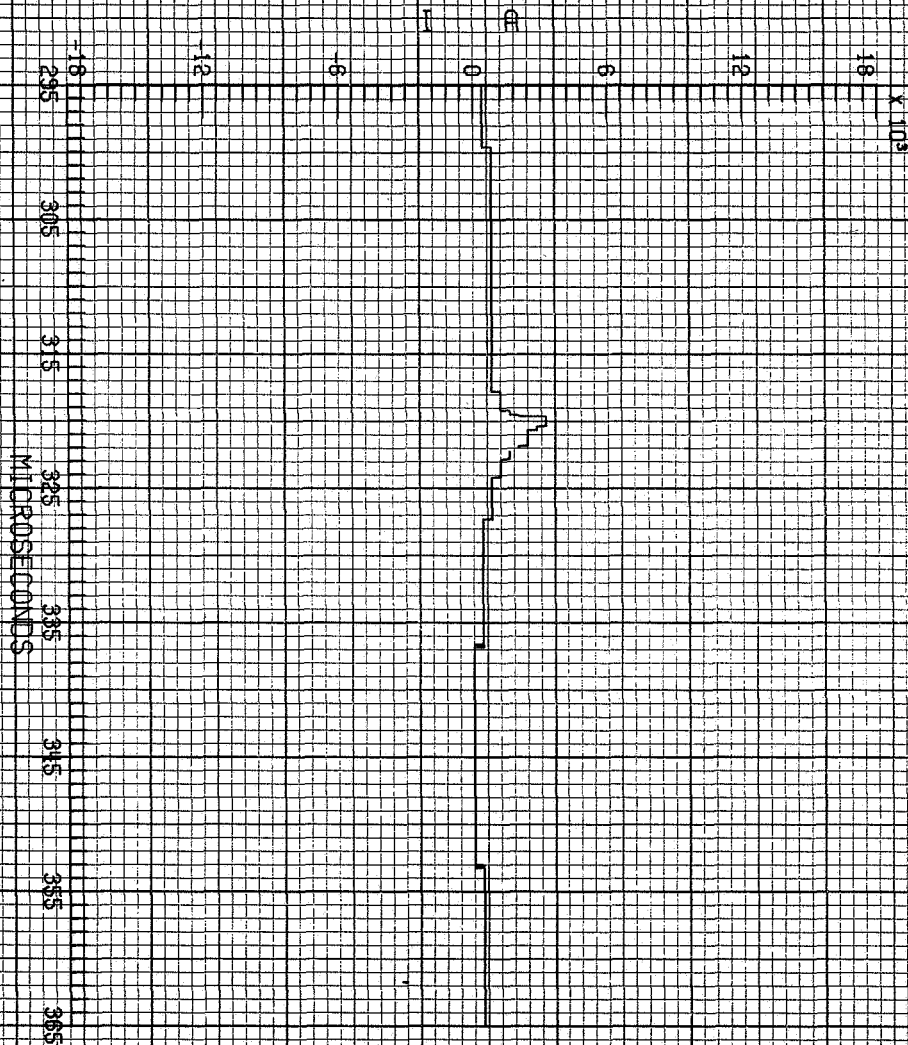


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F106 LIGHTNING/TK-08/M.THOMAS

TEST NO. 82-013

RUN NO. 4



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F106 LIGHTNING/TK.08/M.THOMAS

TEST NO. 82-013

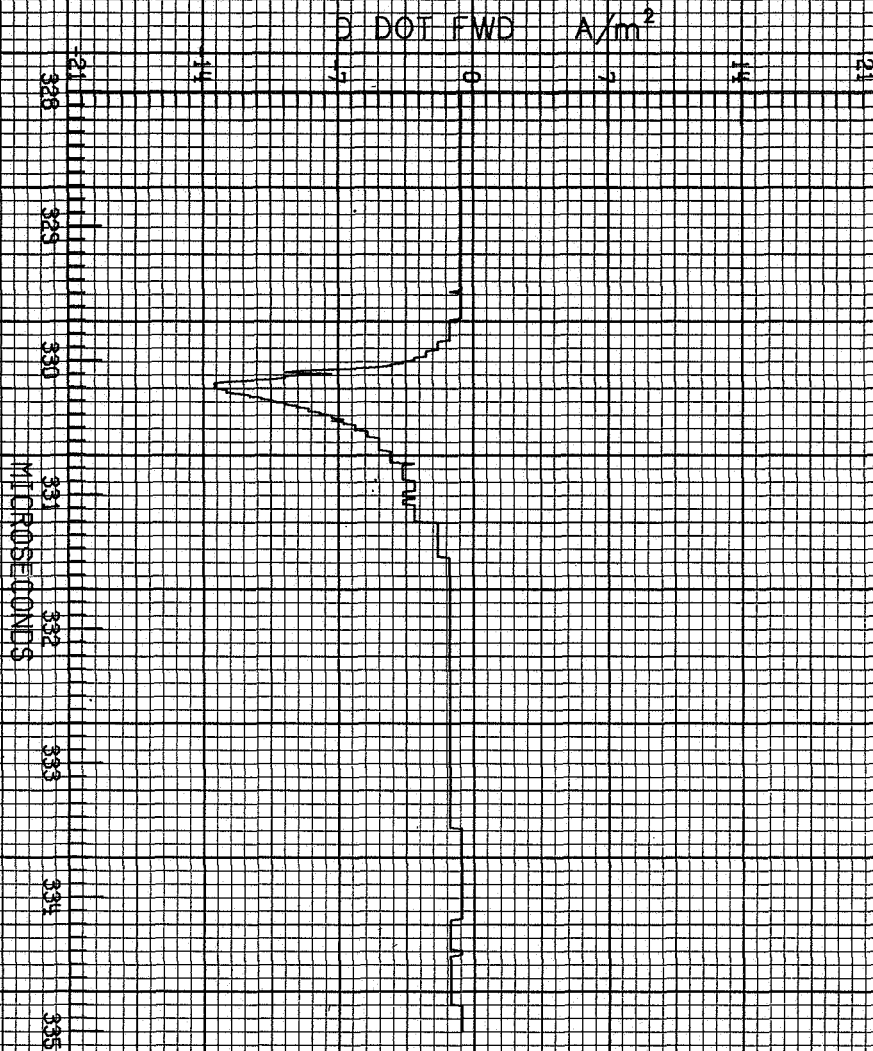
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F106 LIGHTNING/TK10/M.THOMAS

TEST NO. 82-017

RUN NO. 2

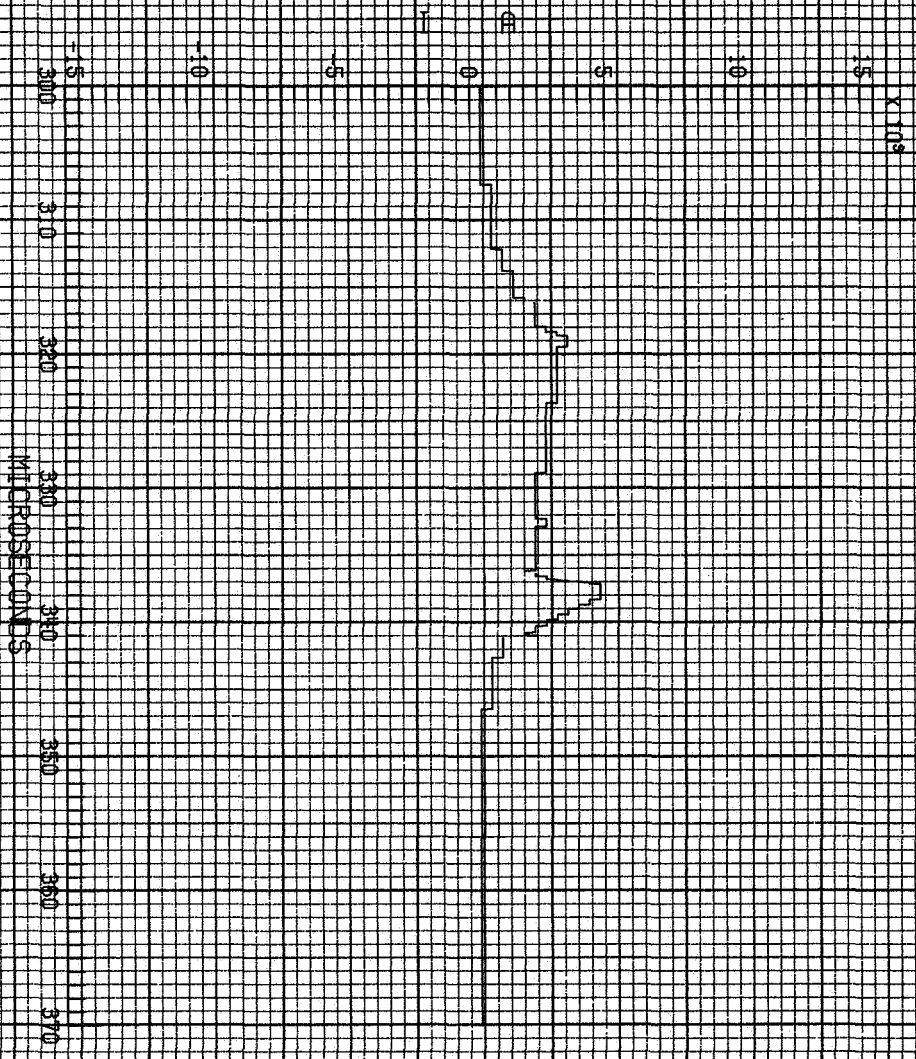


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TEST NO. 82-017

RUN NO. 2



F106 LIGHTNING/TK8/M.THOMBS

TEST NO. 82-017

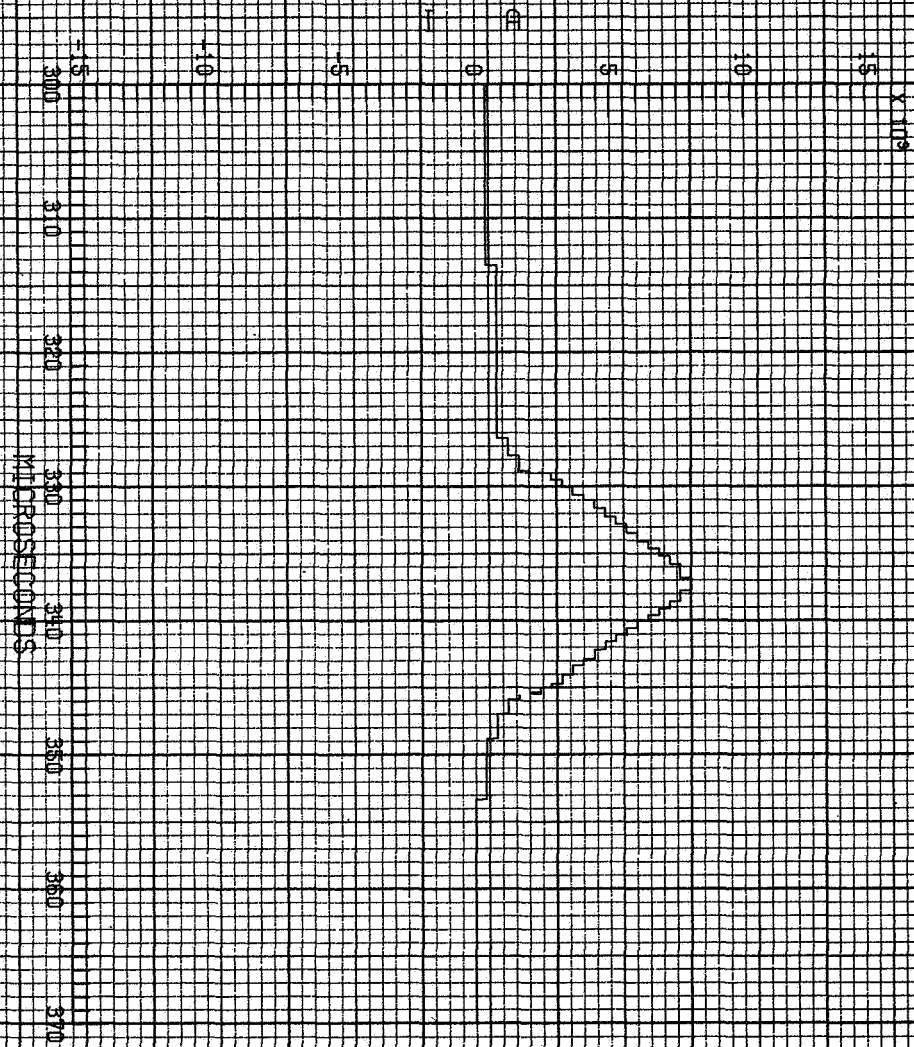
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F106 LIGHTNING/TK8/M. THOMES

TEST NO. 62-017

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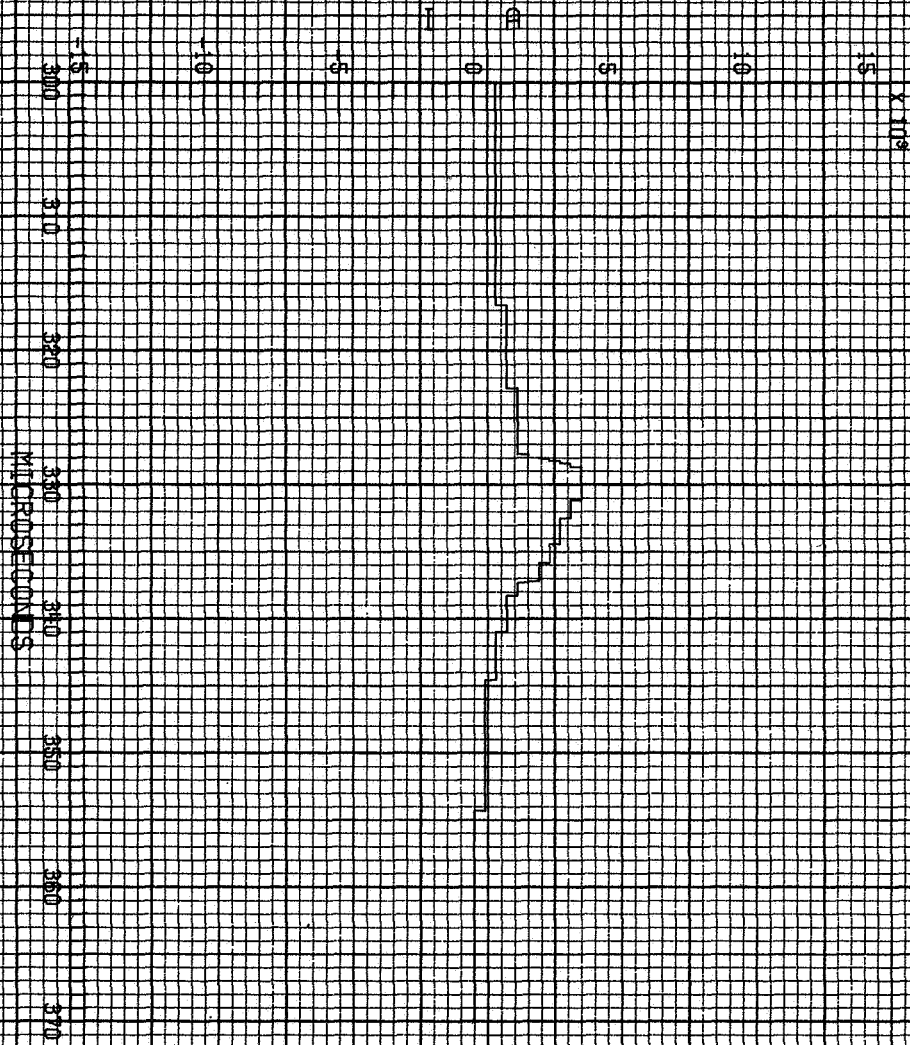


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F106 LIGHTNING/TK6/M.THOMAS

TEST NO. 82-017

RUN NO. 4

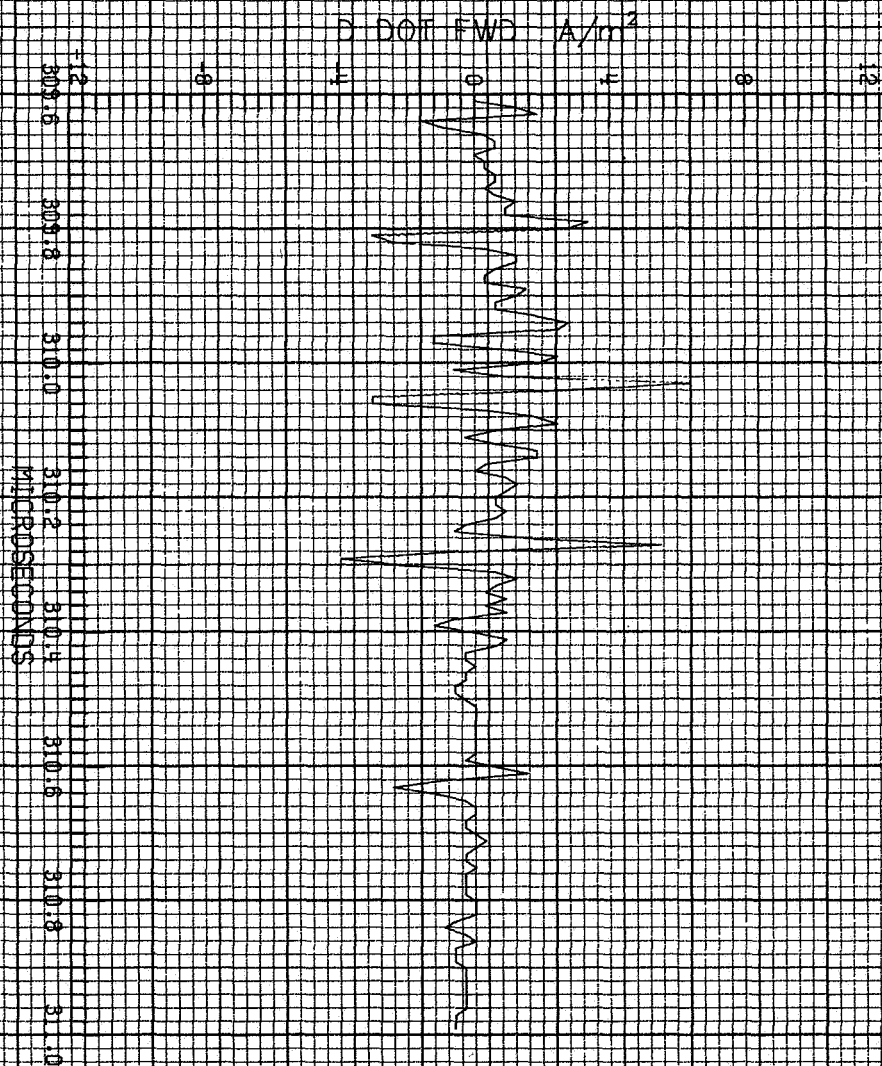


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FL06 LIGHTNING/82-020/PCM/THOMAS

TEST NO. TK-10

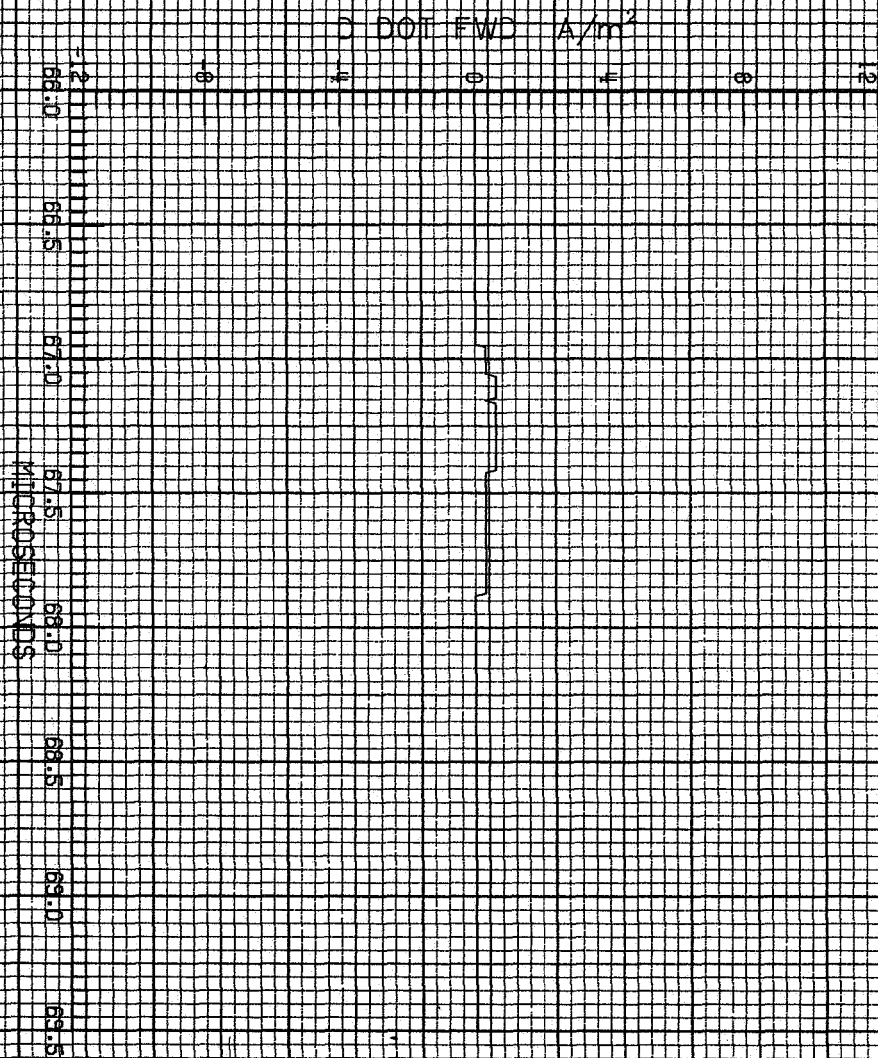
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F106 LIGHTNING/82-020/PCM/THOMAS

TEST NO. TK-10

RUN NO. 2

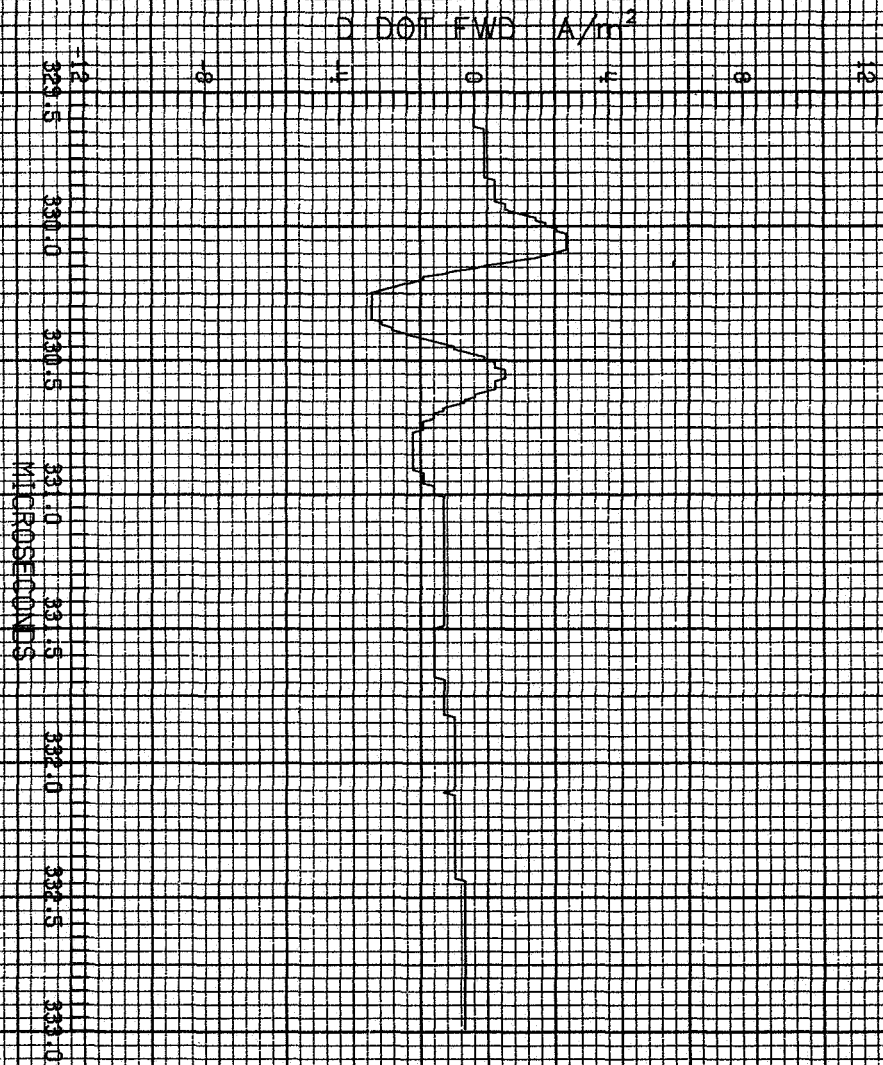


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F106 LIGHTNING/82-023/PCM/THOMAS

TEST NO. TK-10

RUN NO. 2

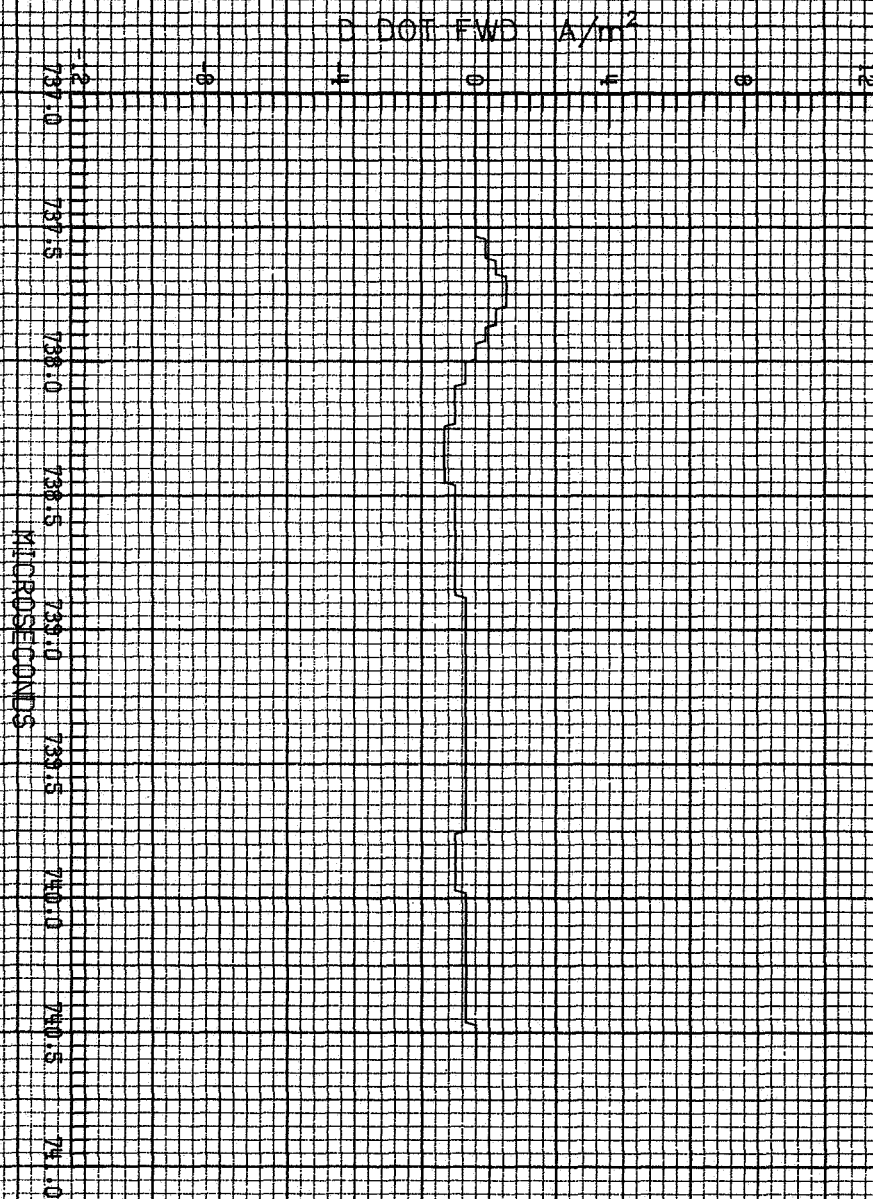


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F106 LIGHTNING/82-020/PCM/THOMAS

TEST NO. TK-10

RUN NO. 2

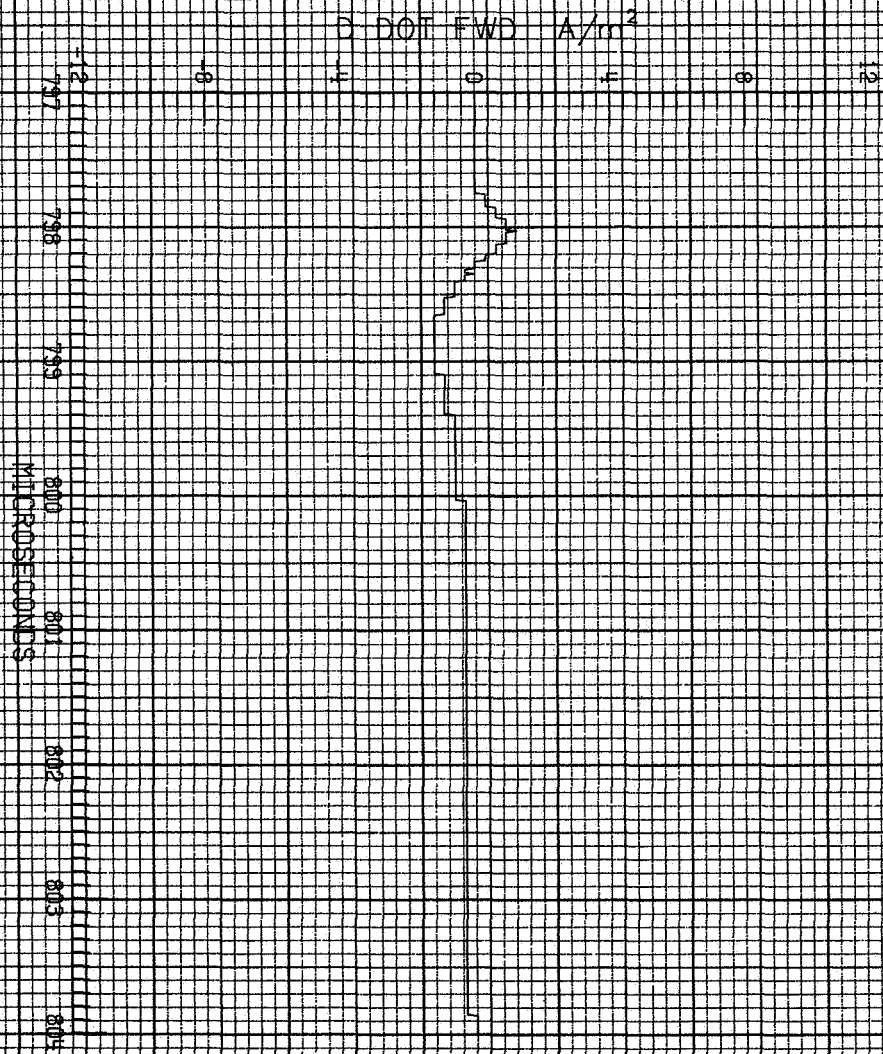


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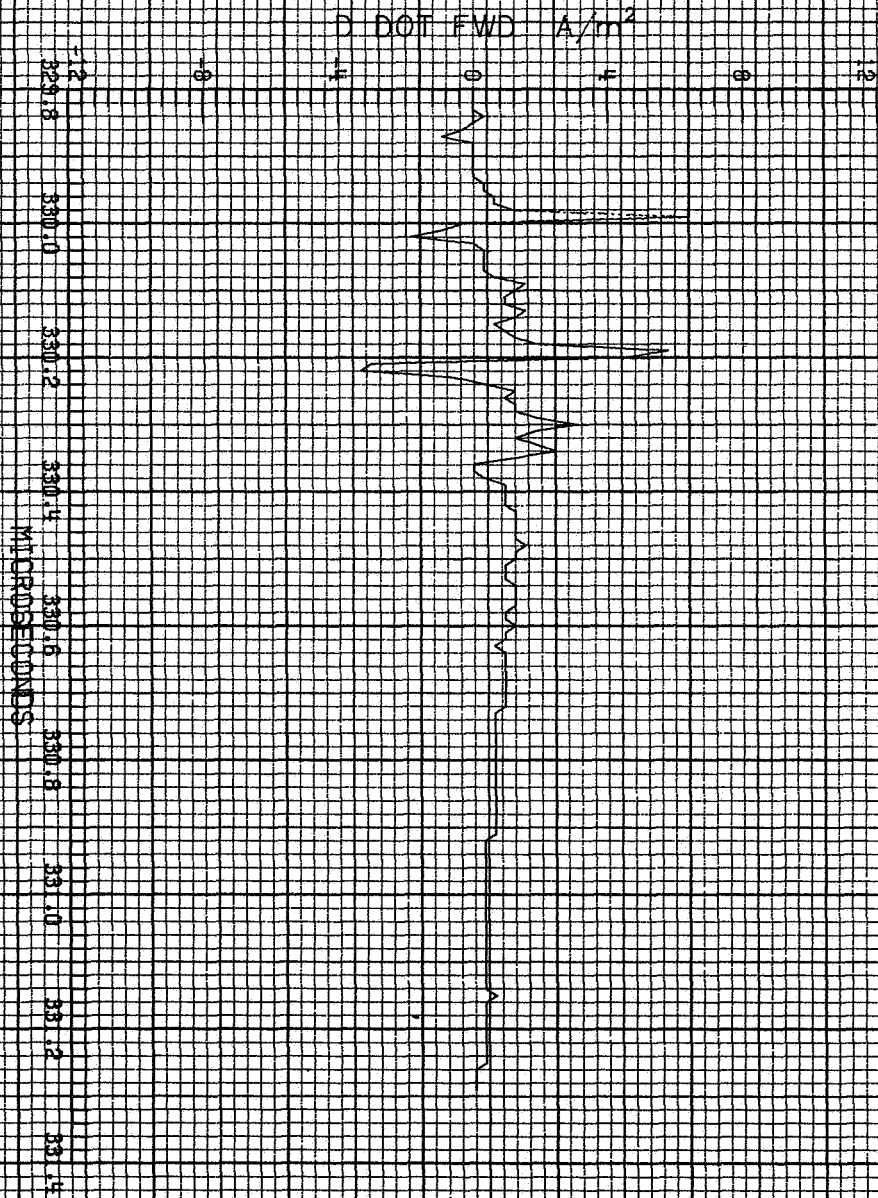
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F106 LIGHTNING/82-020/PCM/THOMAS

TEST NO. TK-10

RUN NO. 3



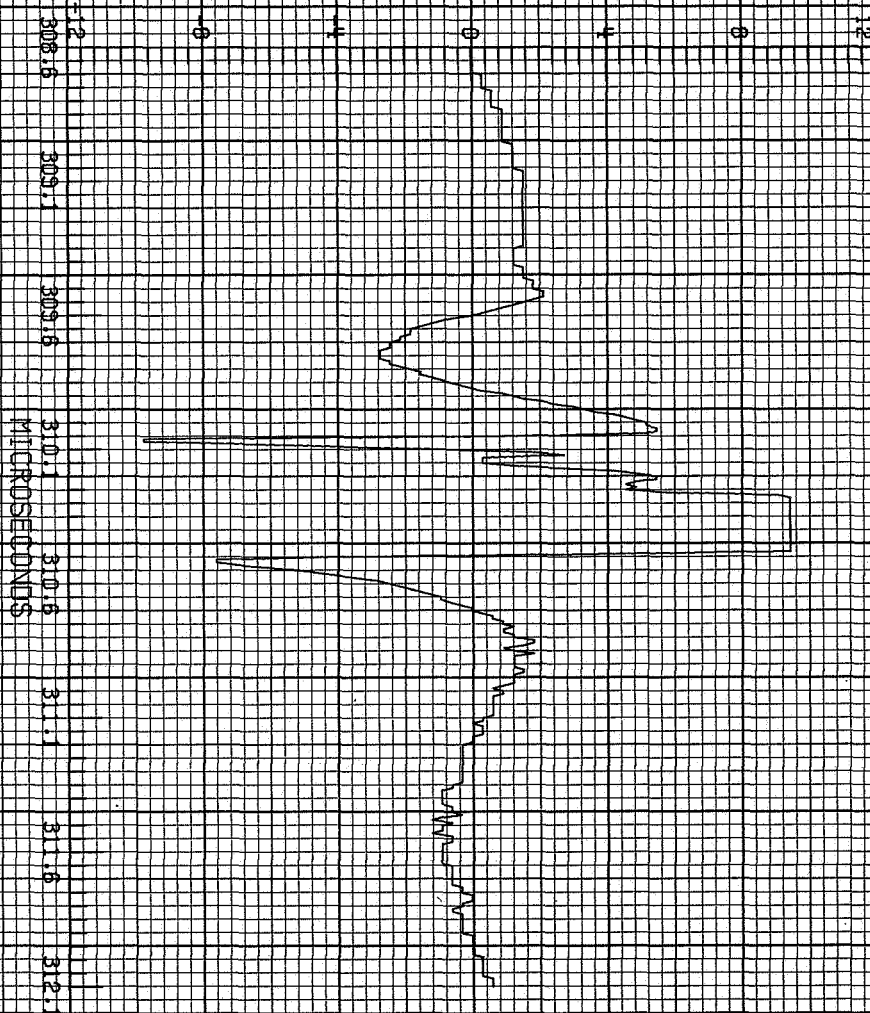
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F106 LIGHTNING/82-023/PCM/THOMAS

TEST NO. TK-10

RUN NO. 1

D DGT FWD A/M²

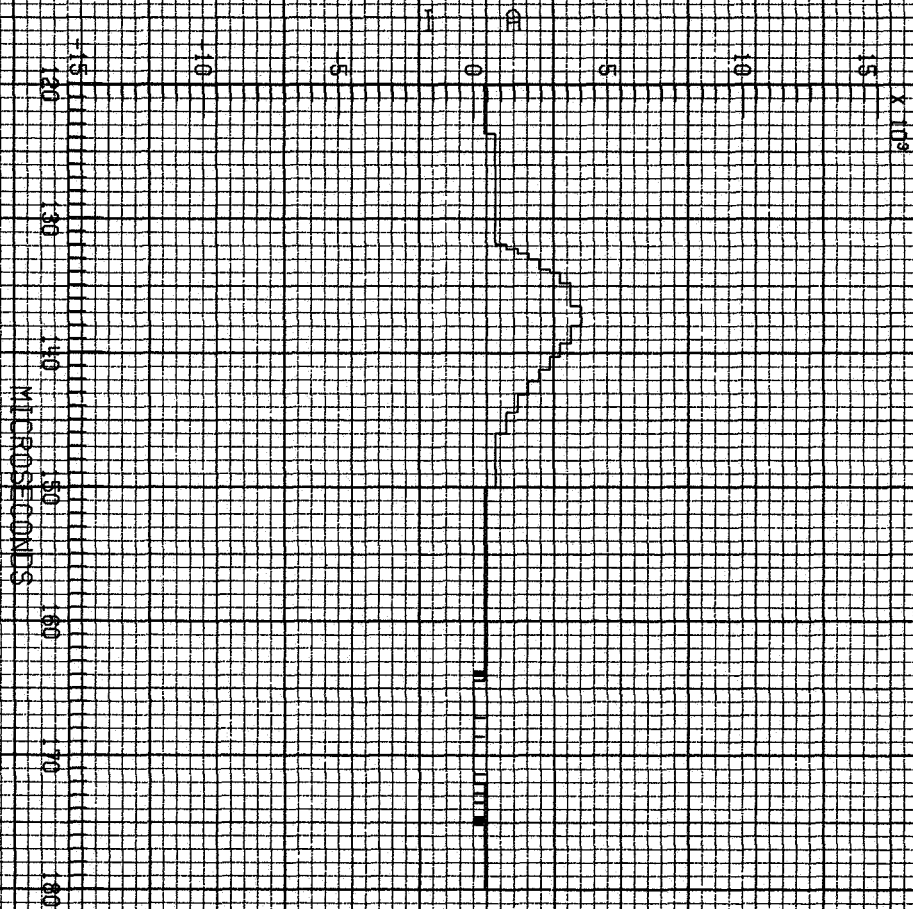


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F106 LIGHTNING/82-026/PCM/THOMAS

TEST NO. TK-8

RUN NO. 2

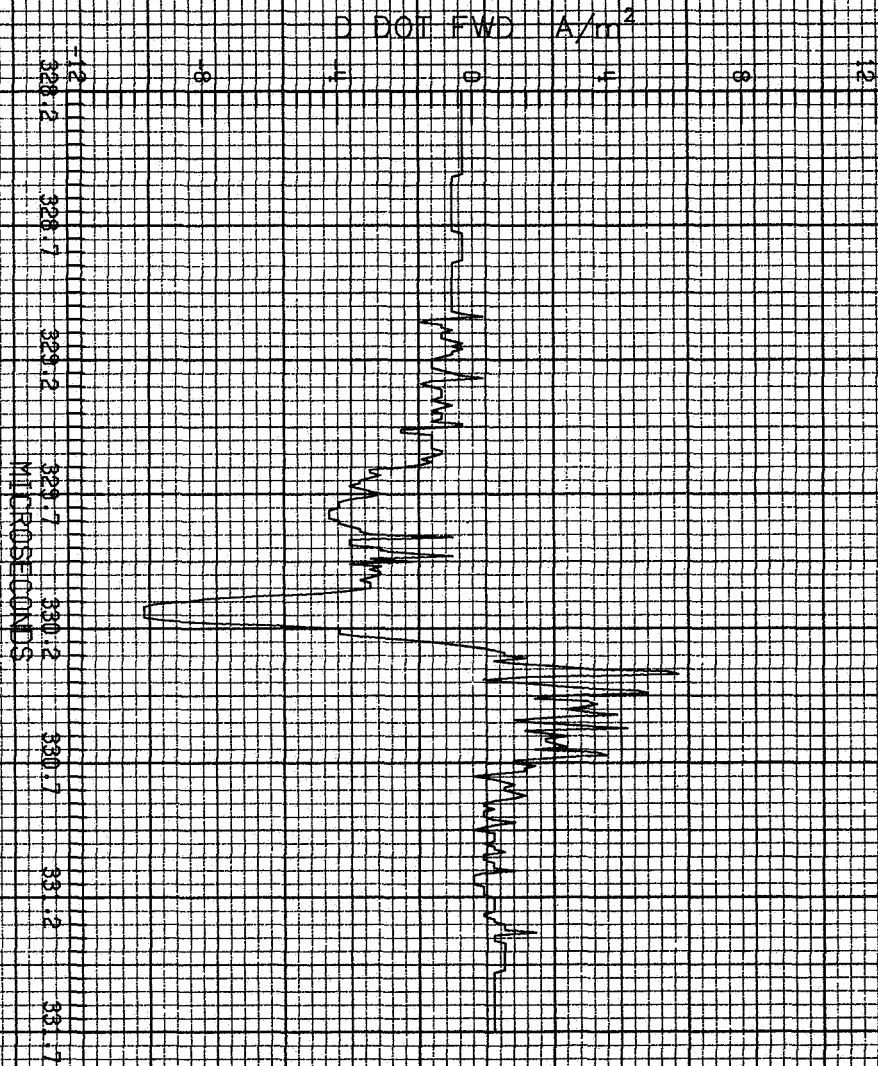


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F106 LIGHTNING/82-023/PCM/THOMAS

TEST NO. TK-10

RUN NO. 3

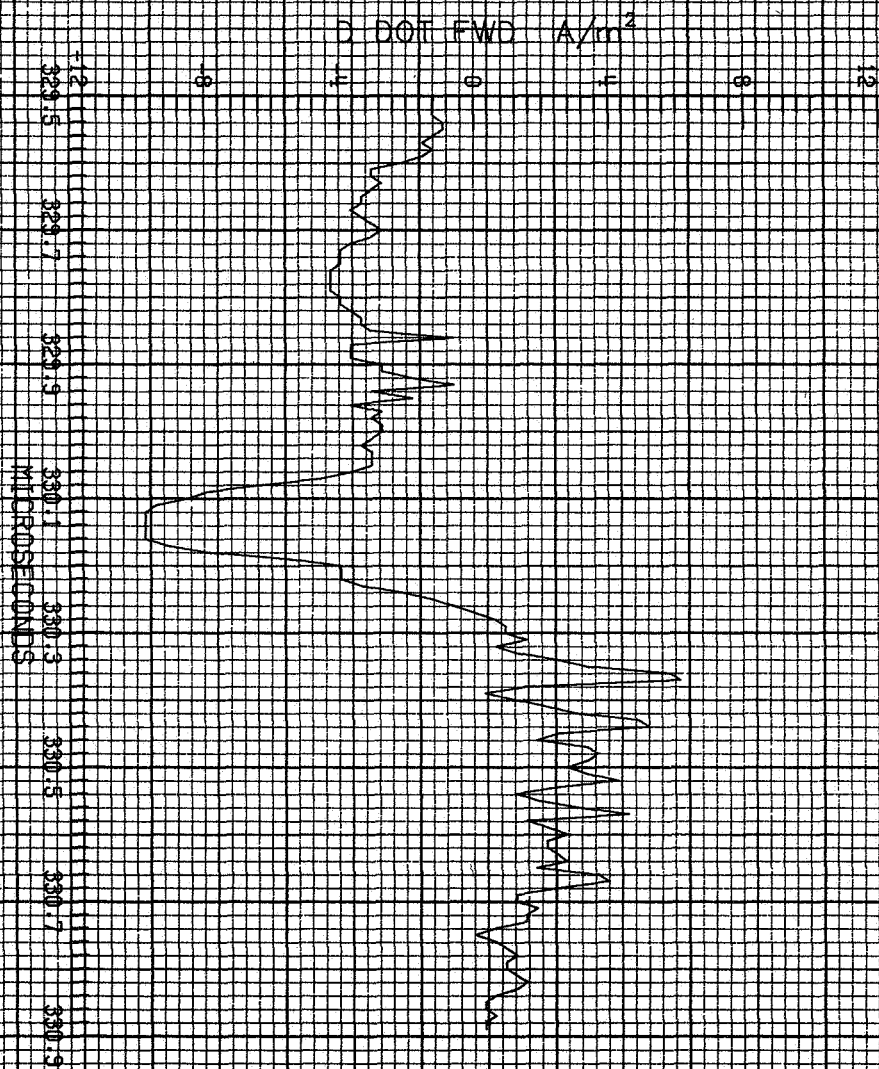


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F106 LIGHTNING/82-023/PCM/THOMAS

TEST NO. TK-10

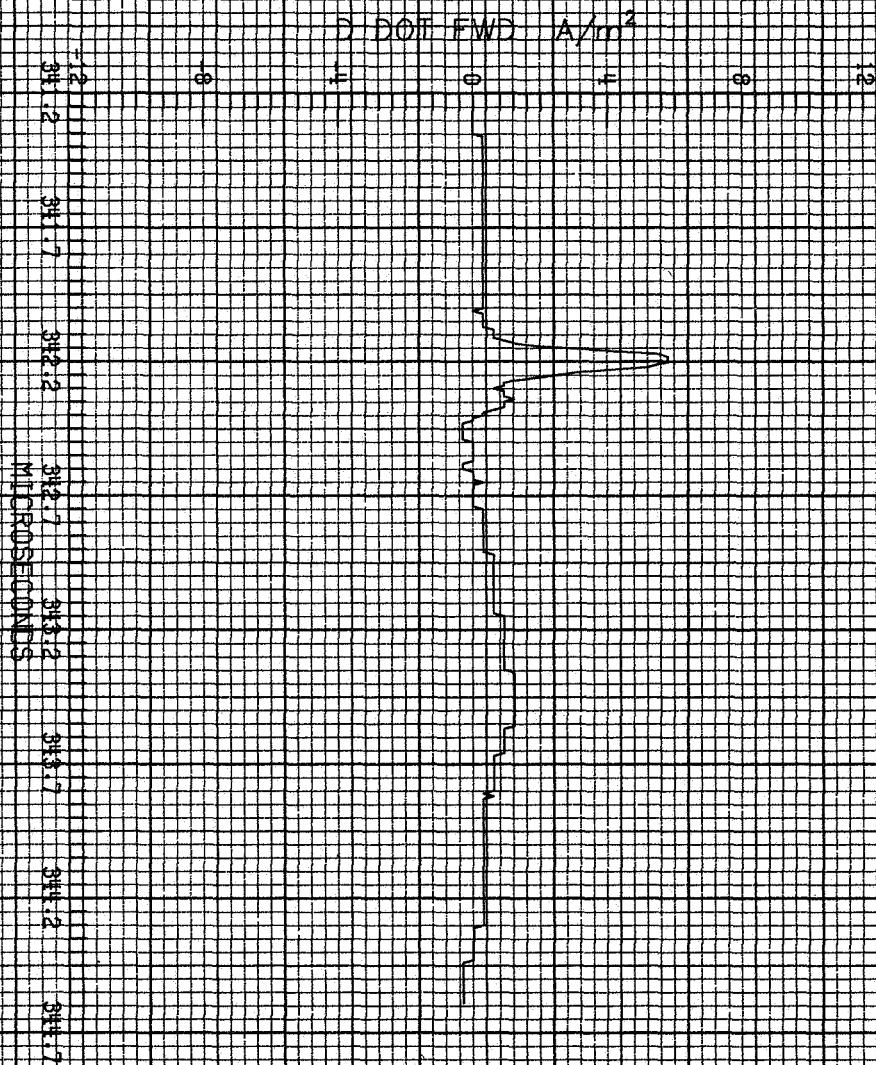
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F106 L116 TNING/82-023/PCM/THOMAS

TEST NO. TK-10

RUN NO. 3

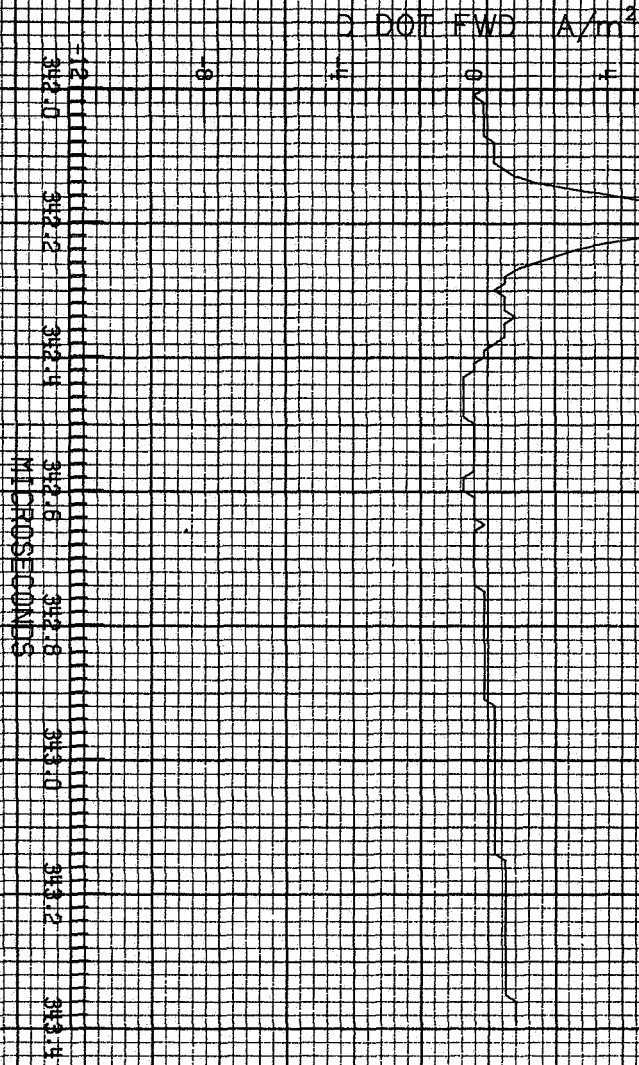


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TEST NO. TK-10

RUN NO. 3

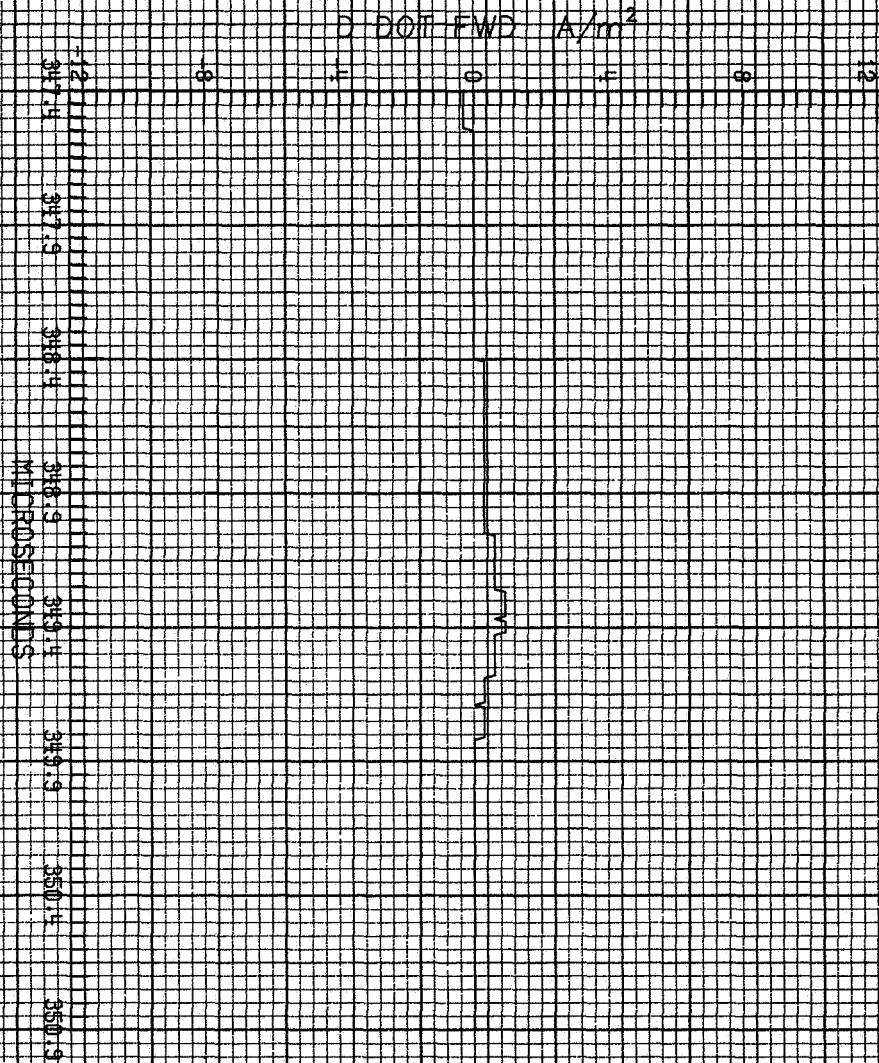


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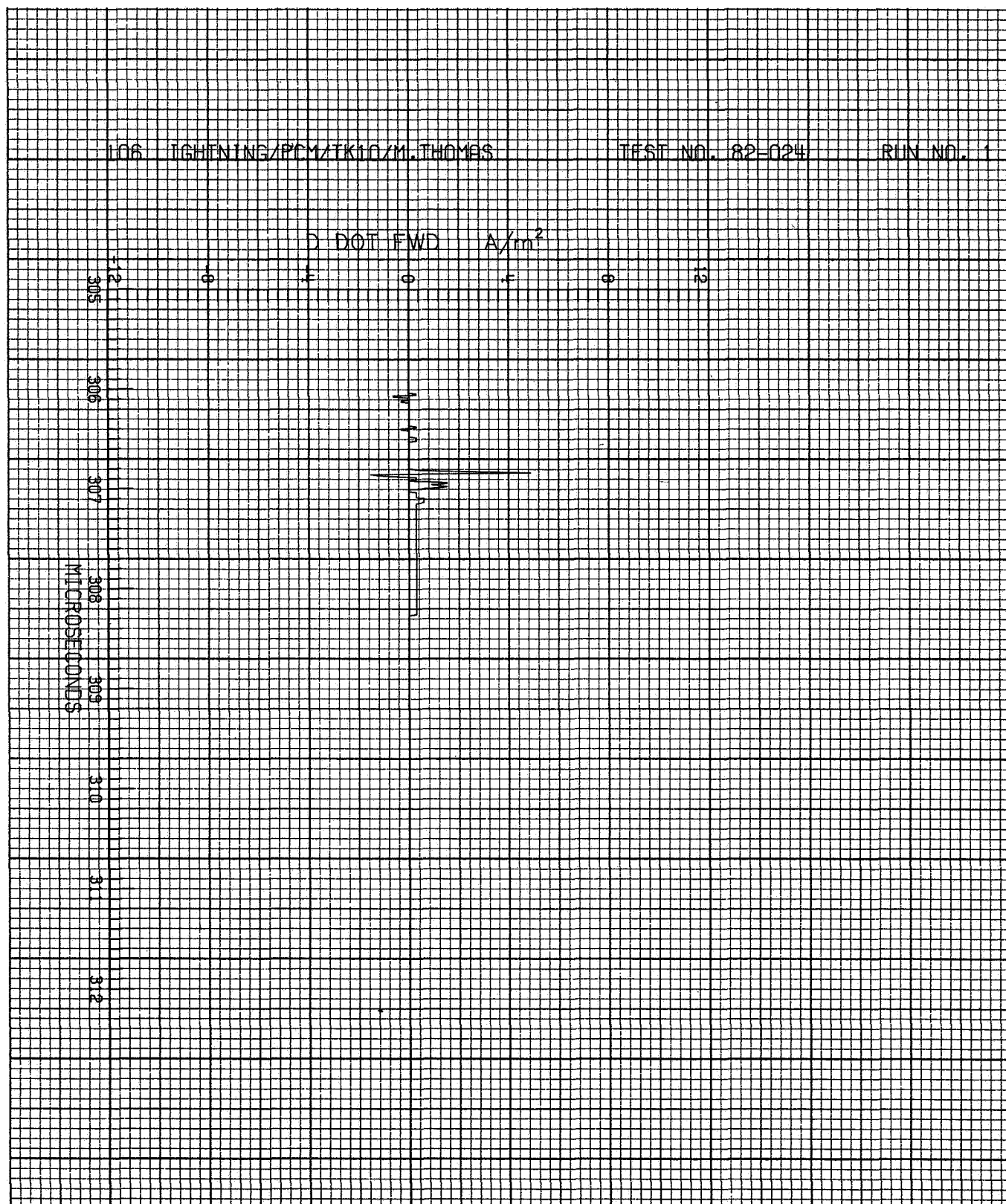
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TEST NO. TK-10

RUN NO. 3



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106 - LIGHTNING/PCM/TK10/M. THOMES

TEST NO. 82-624

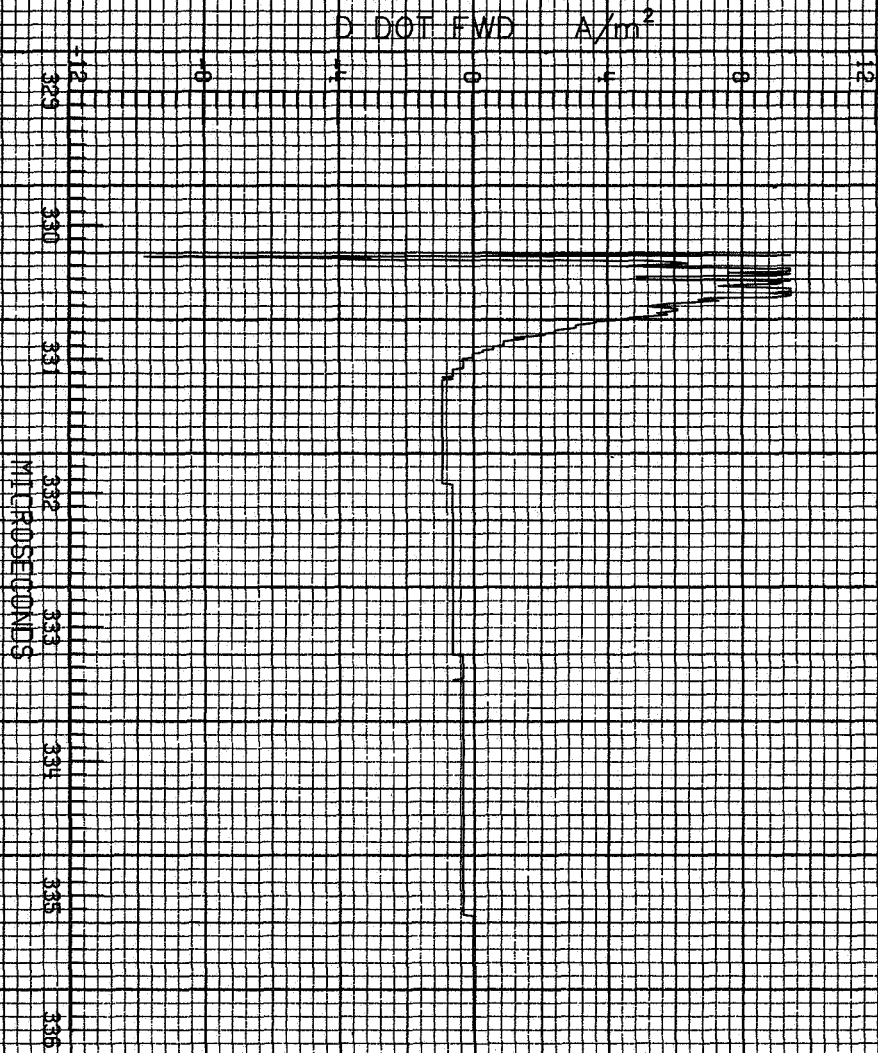
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106 LIGHTNING/PCM/TK10/M. THOMES

TEST NO. 82-C24

RUN NO. 2

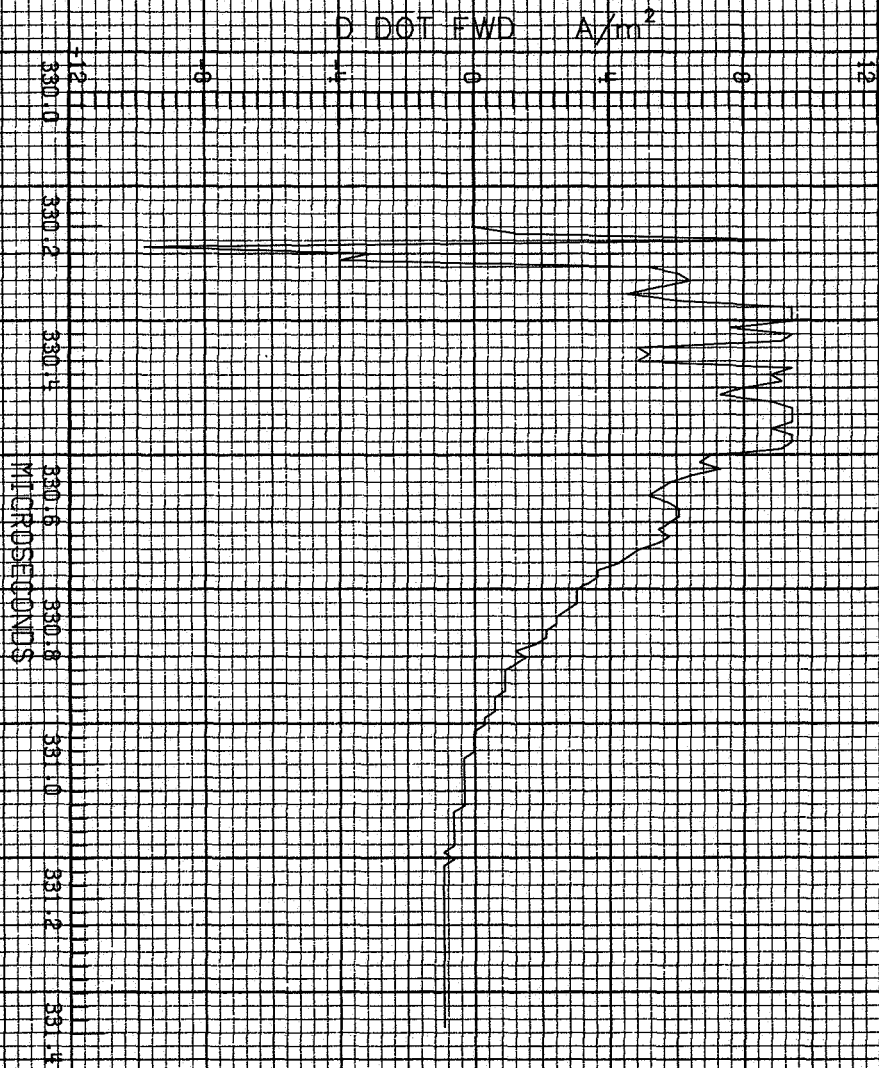


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106 LIGHTNING/PCM/TK10/M.THOMES

TEST NO. 82-024

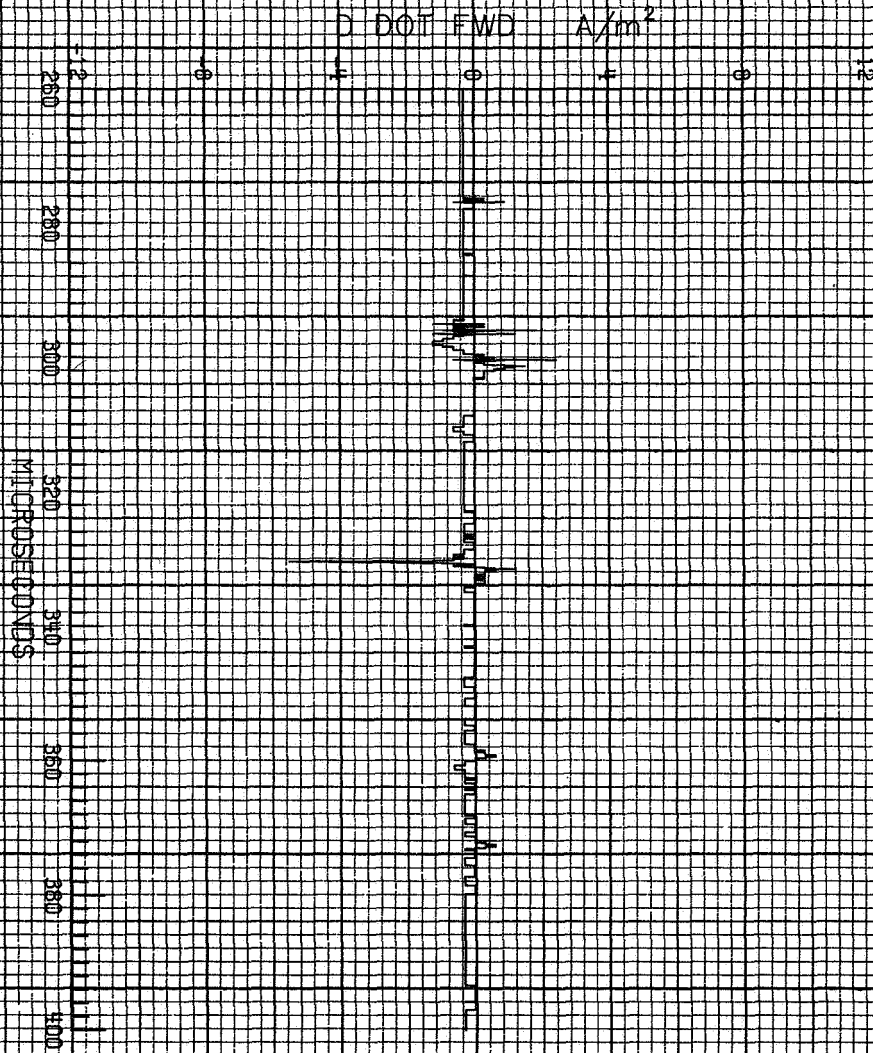
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106 LIGHTNING/PCM/TK10/M.THOMES

TEST NO. 82-024

RUN NO. 3



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106 LIGHTNING/PCM/TK10/M. THOMES

TEST NO. 82-024

RUN NO. 3

D DOT FWD A/m^2

276.0
276.2
276.4
276.6
276.8
277.0
277.2
277.4
MICROSECONDS

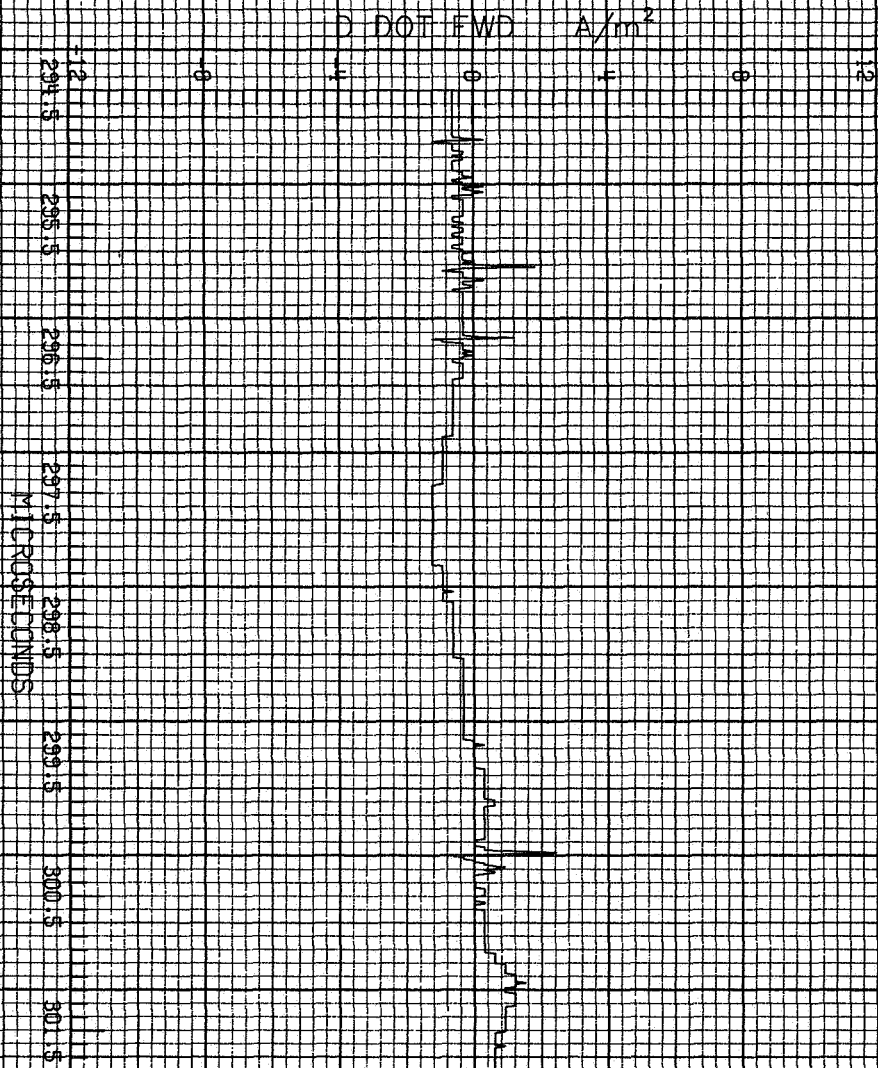


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106 TIGHTENING/PCM/TK10/M.THOMAS

TEST NO. 82-024

RUN NO. 3

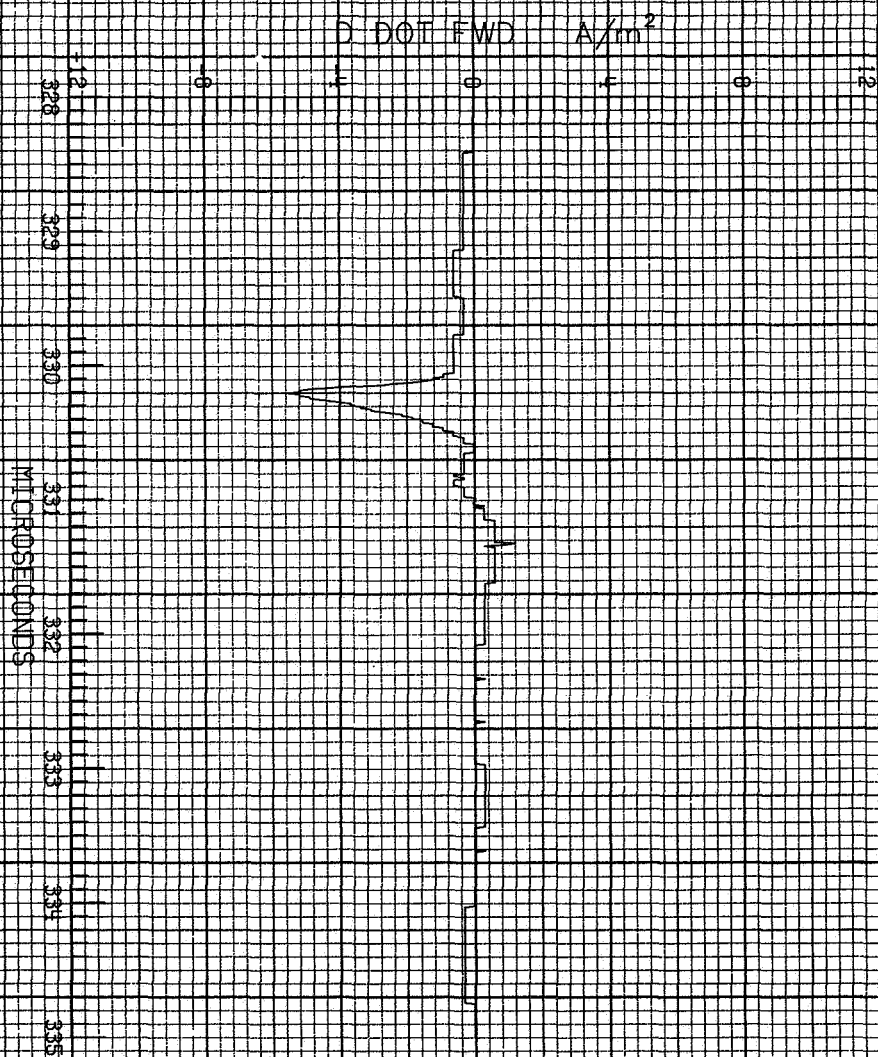


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TEST NO. 82-024

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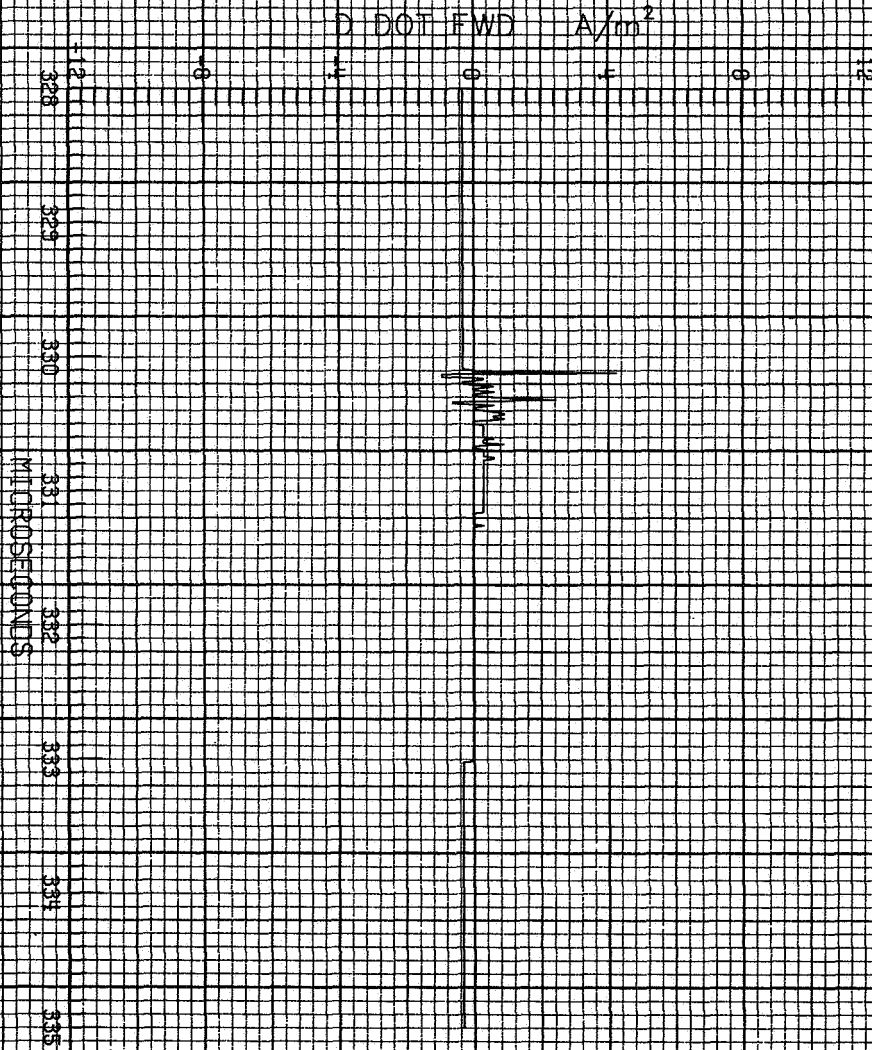


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TEST NO. 82-024

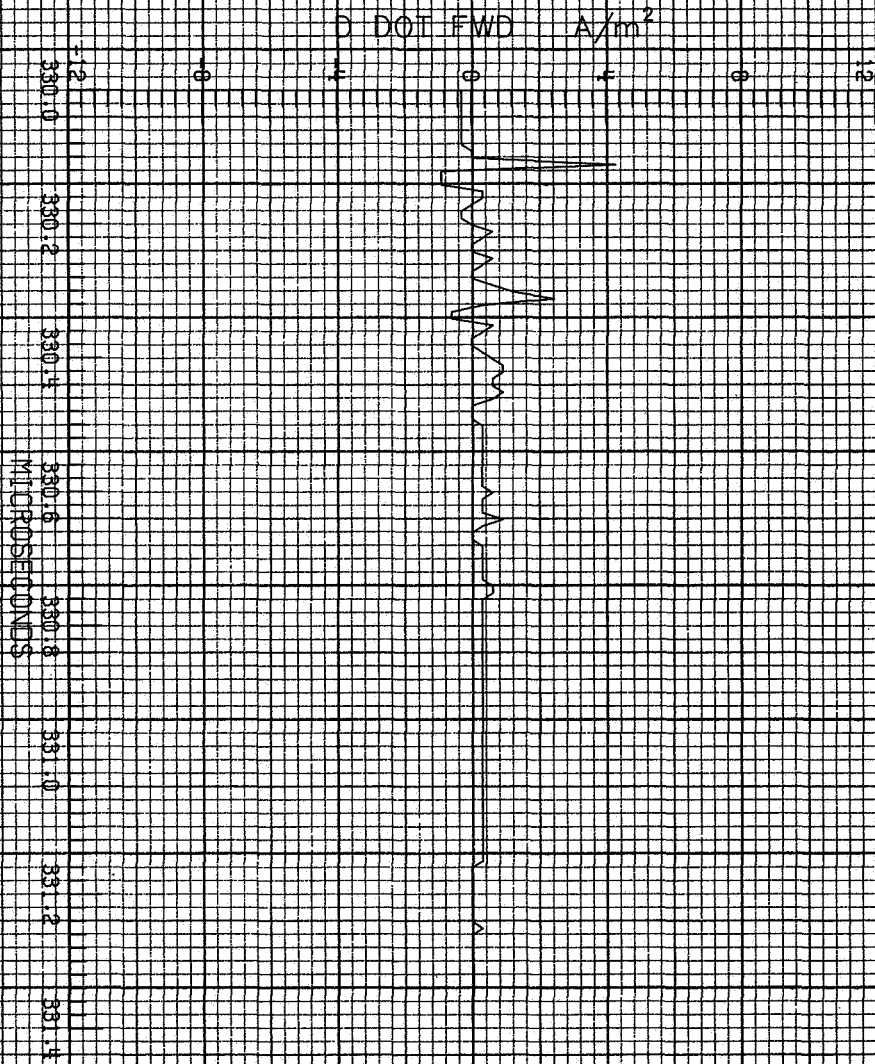
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106 LIGHTNING/PCM/TK10/M.THOMES

TEST NO. 82-024

RUN NO. 4

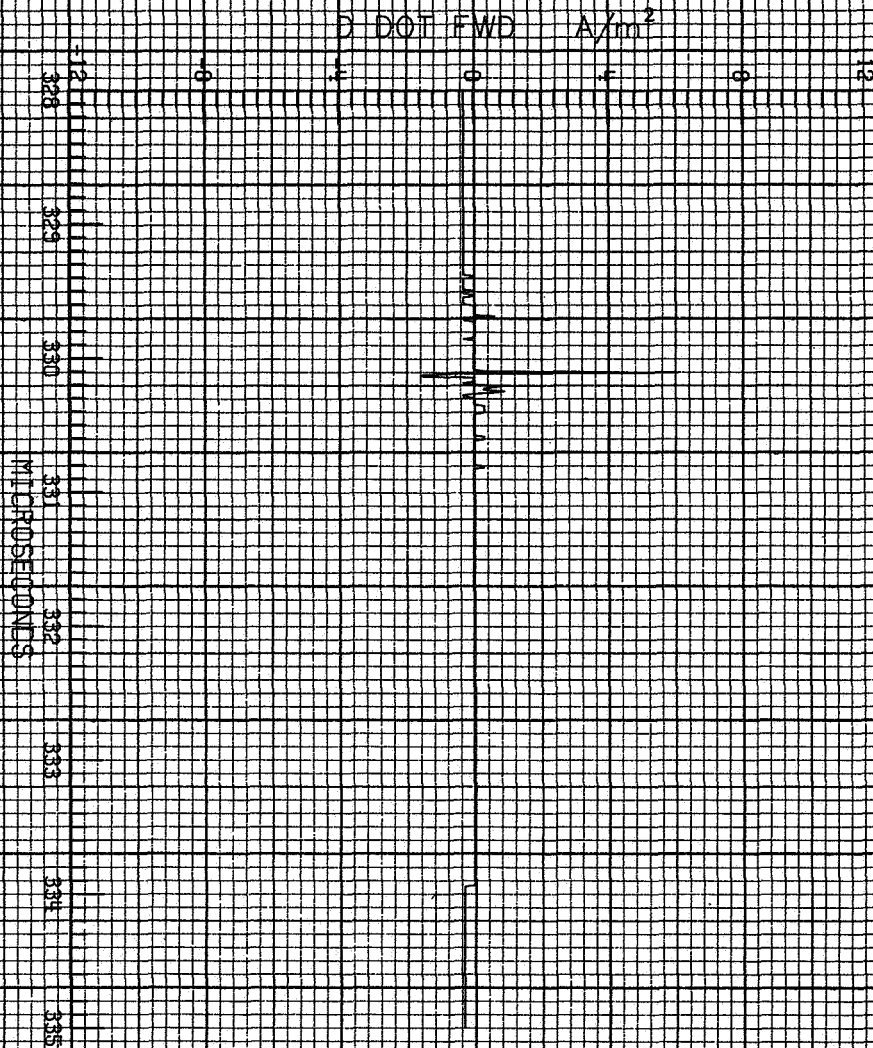


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TEST NO. 82-024

RUN NO. 5

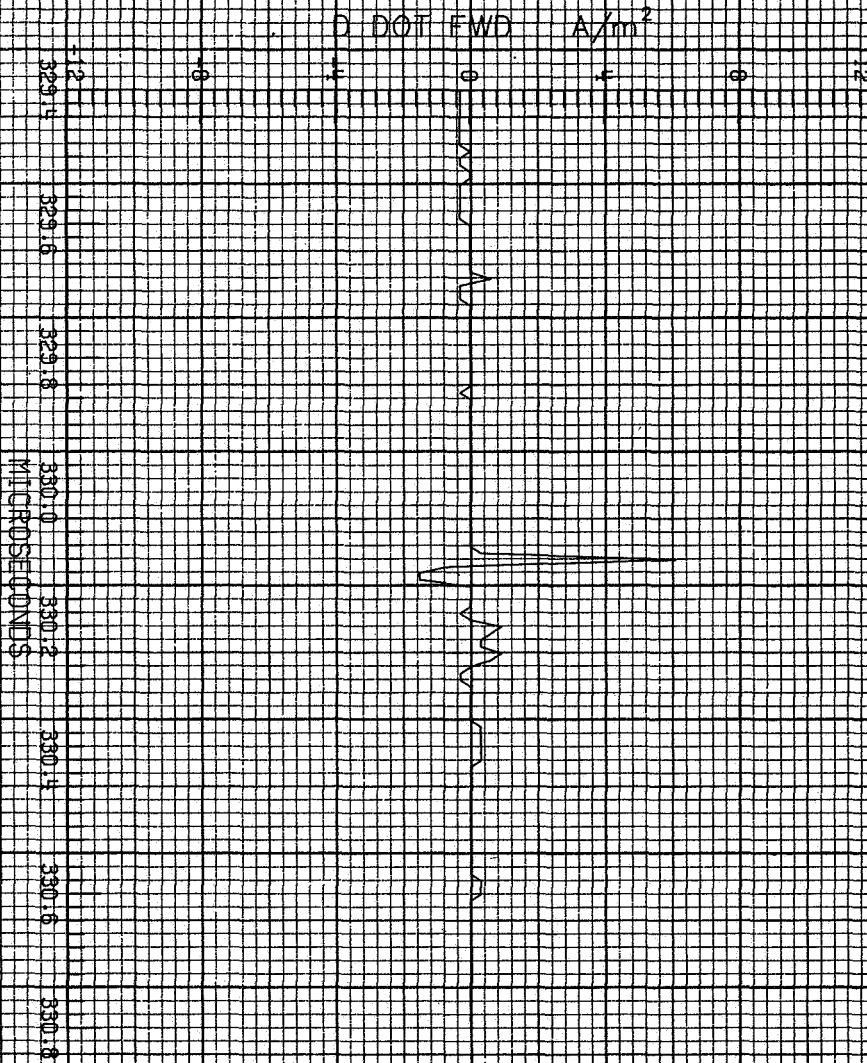


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TEST NO. 82-024

RUN NO. 5

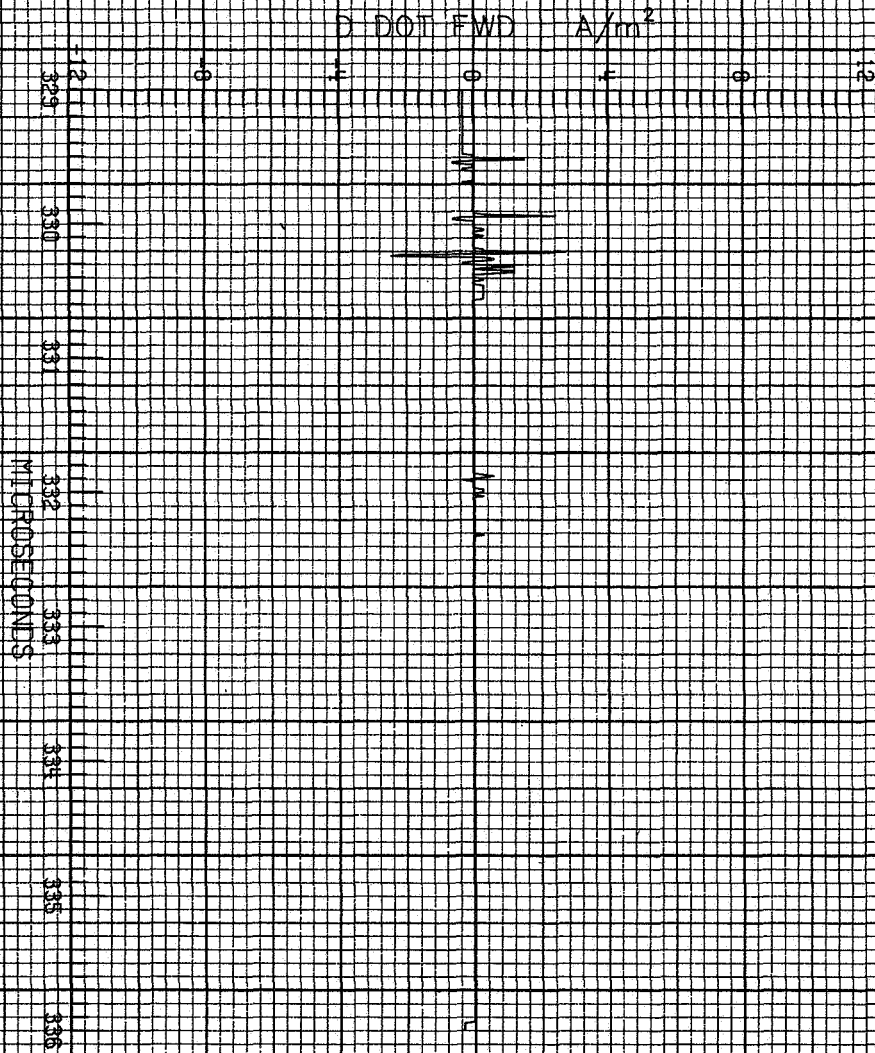


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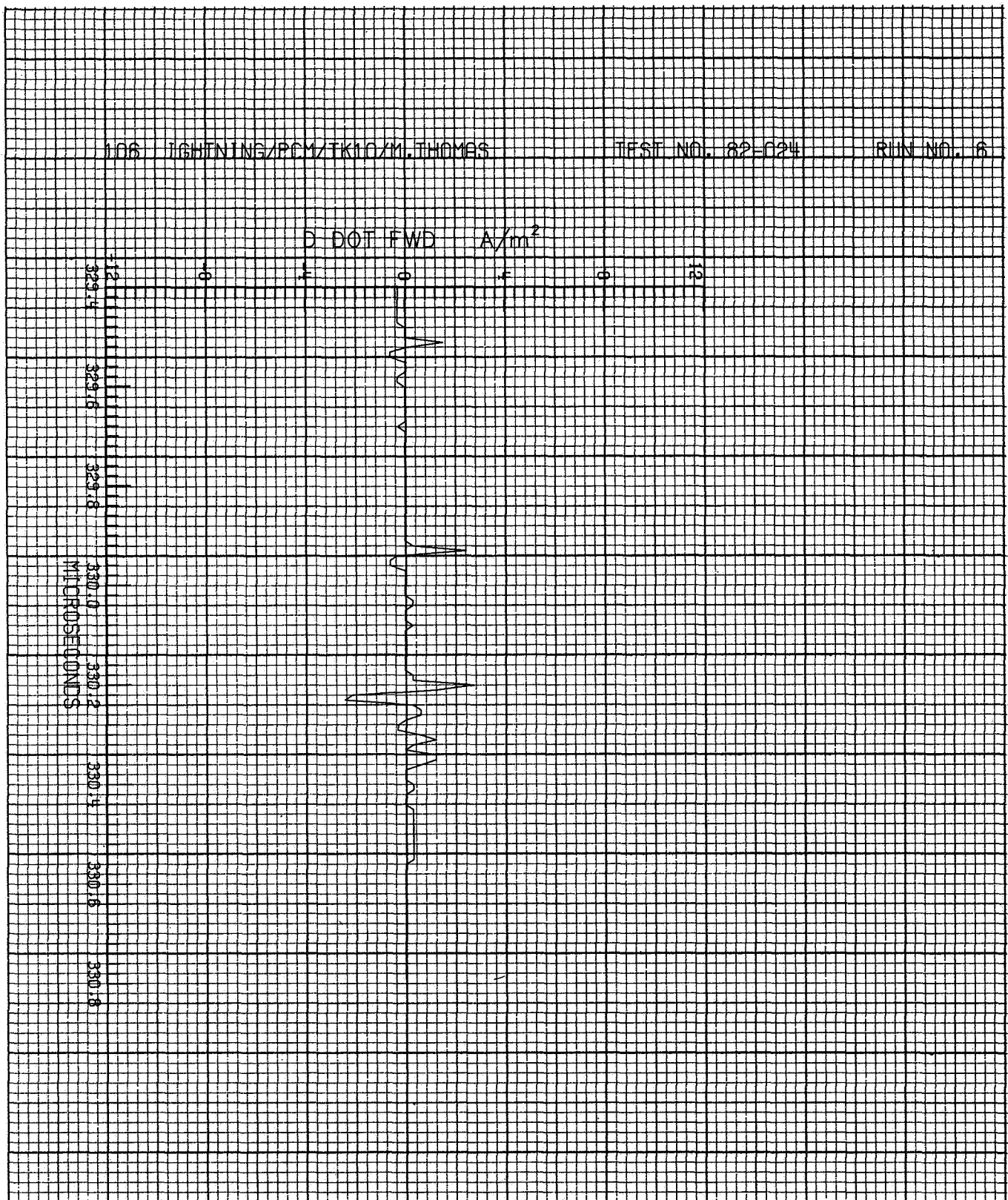
106 LIGHTNING/PCM/TK10/M. THOMES

TEST NO. 82-024

RUN NO. 6



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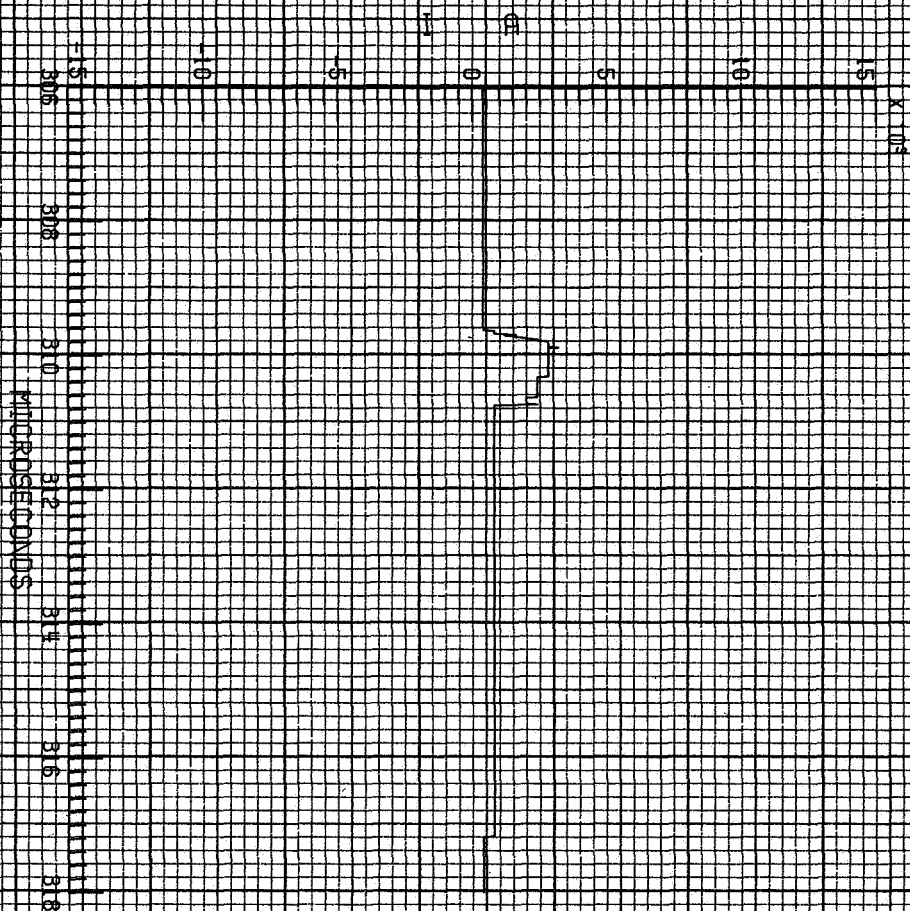


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106 LIGHTNING/PCM/TK8/M. THOMAS

TEST NO. 82-624

RUN NO. 7



106 LIGHTNING/PCM/TK8/M. THOMAS

TEST NO. 82-024

RUN NO. 7

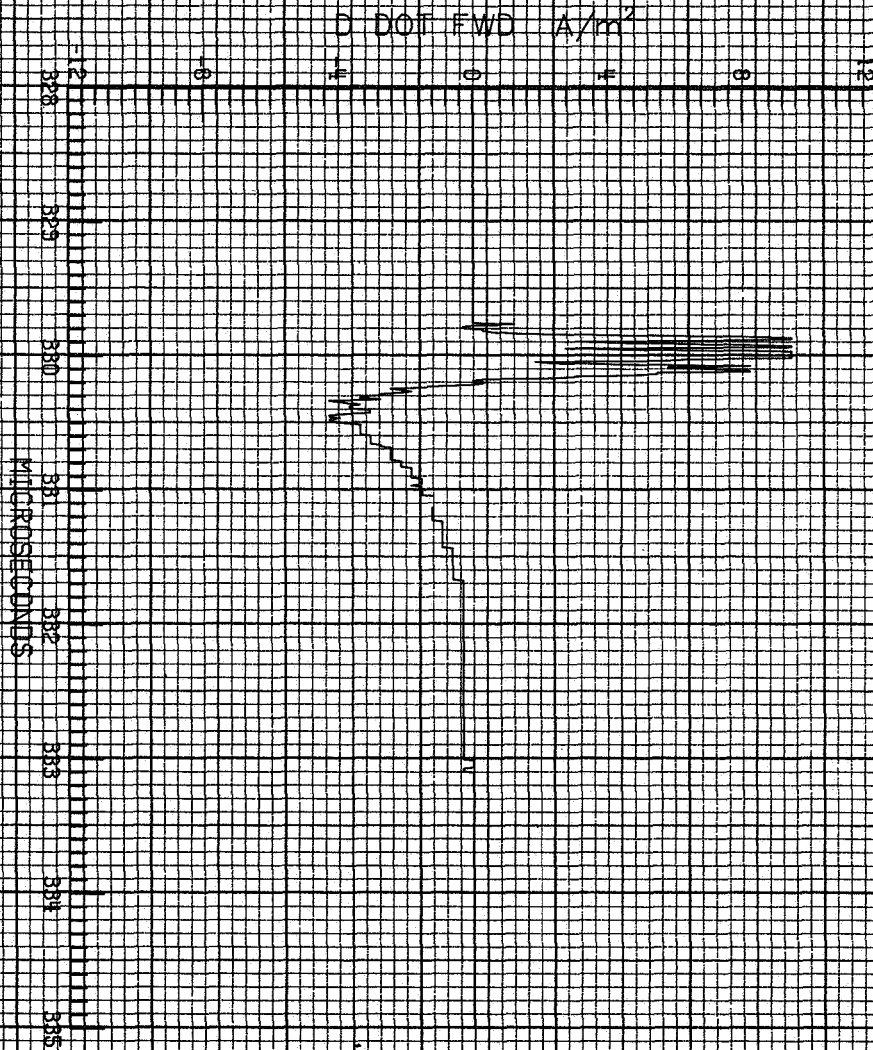


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TEST NO. 82-024

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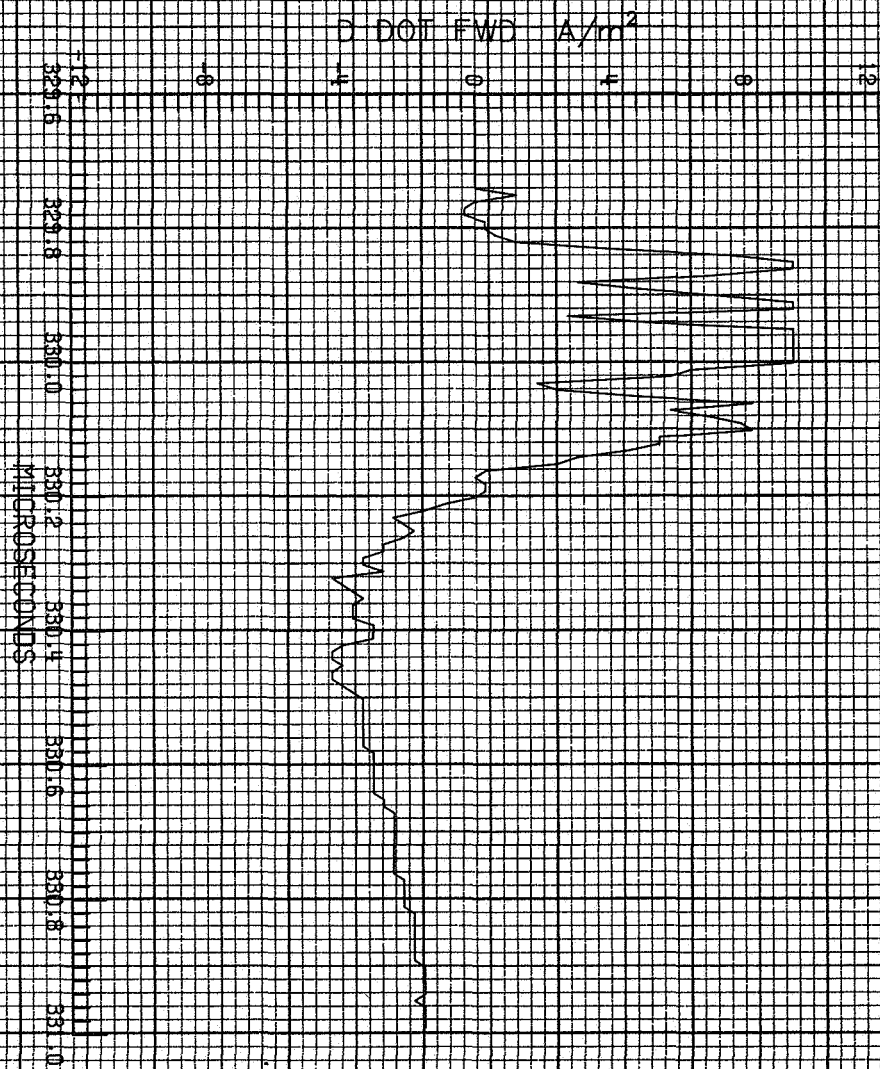


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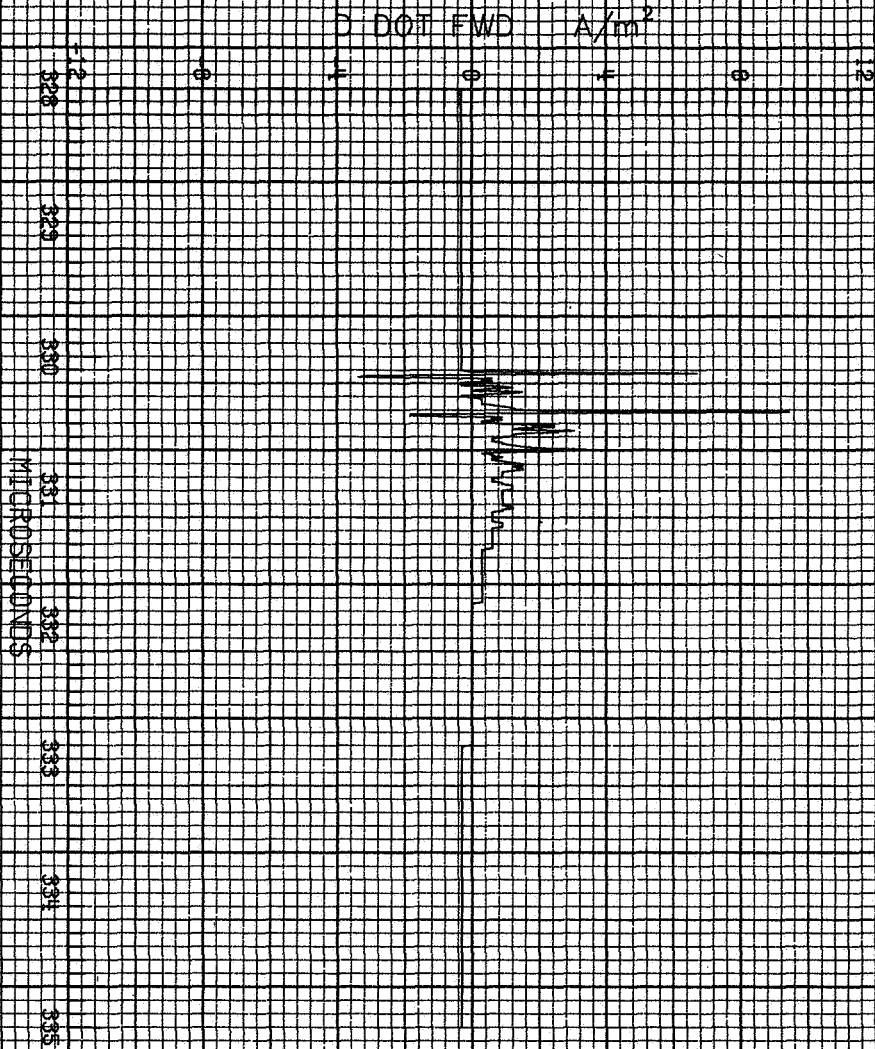
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106 ICHTINIS/PCM/TK10/M.THOMES

TEST NO. 82-024

RUN NO. 8

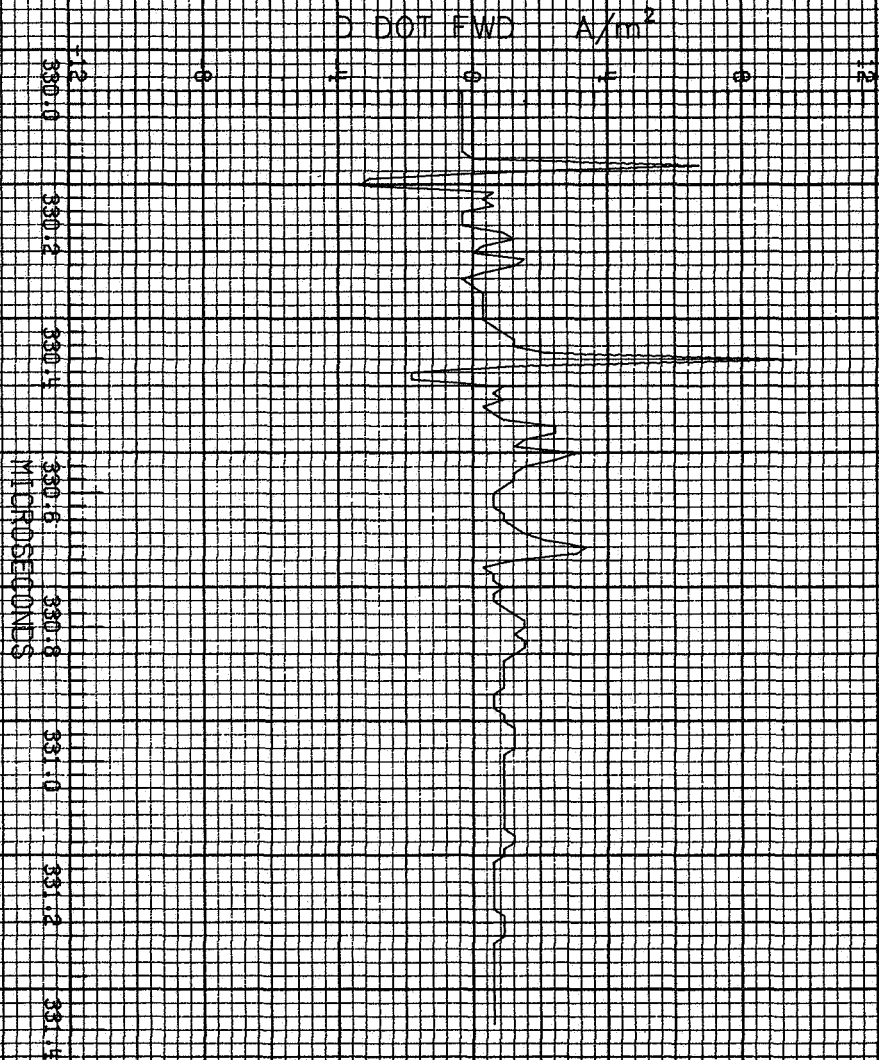


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TEST NO. 82-024

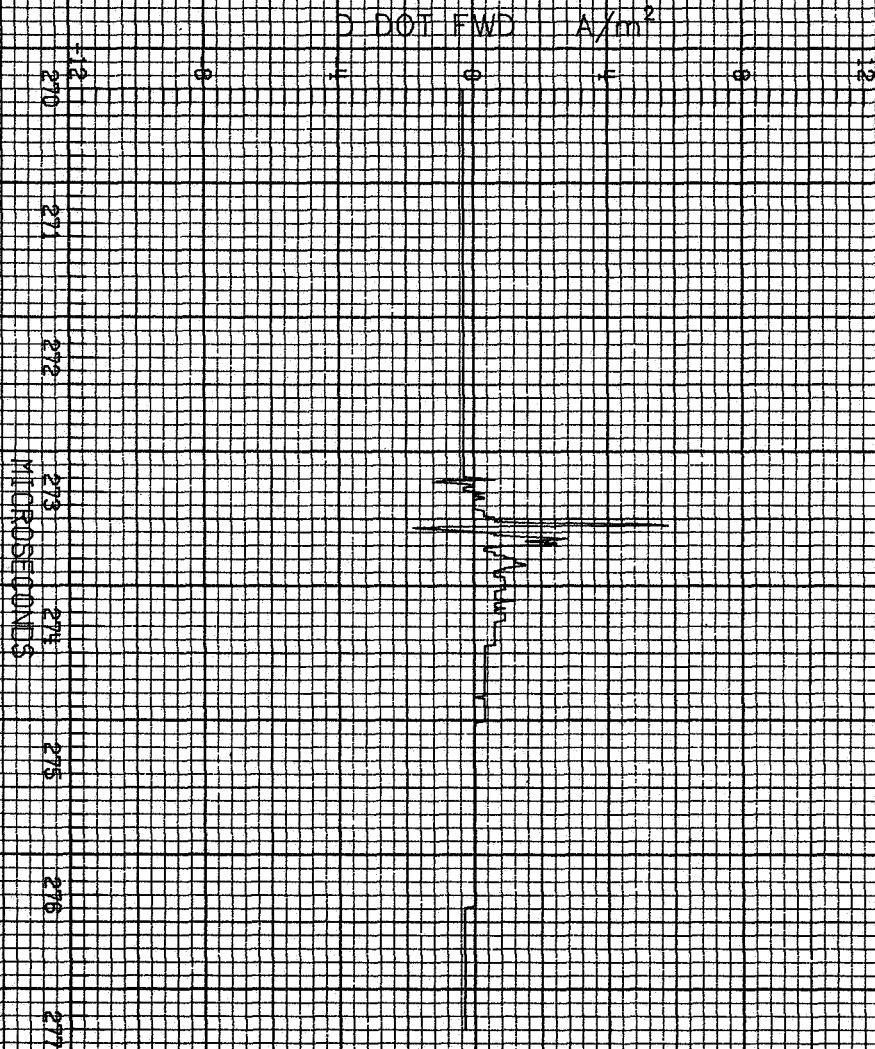
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106 IGHENING/PCM/TK10/M.L.THOMES

TEST NO. 82-024

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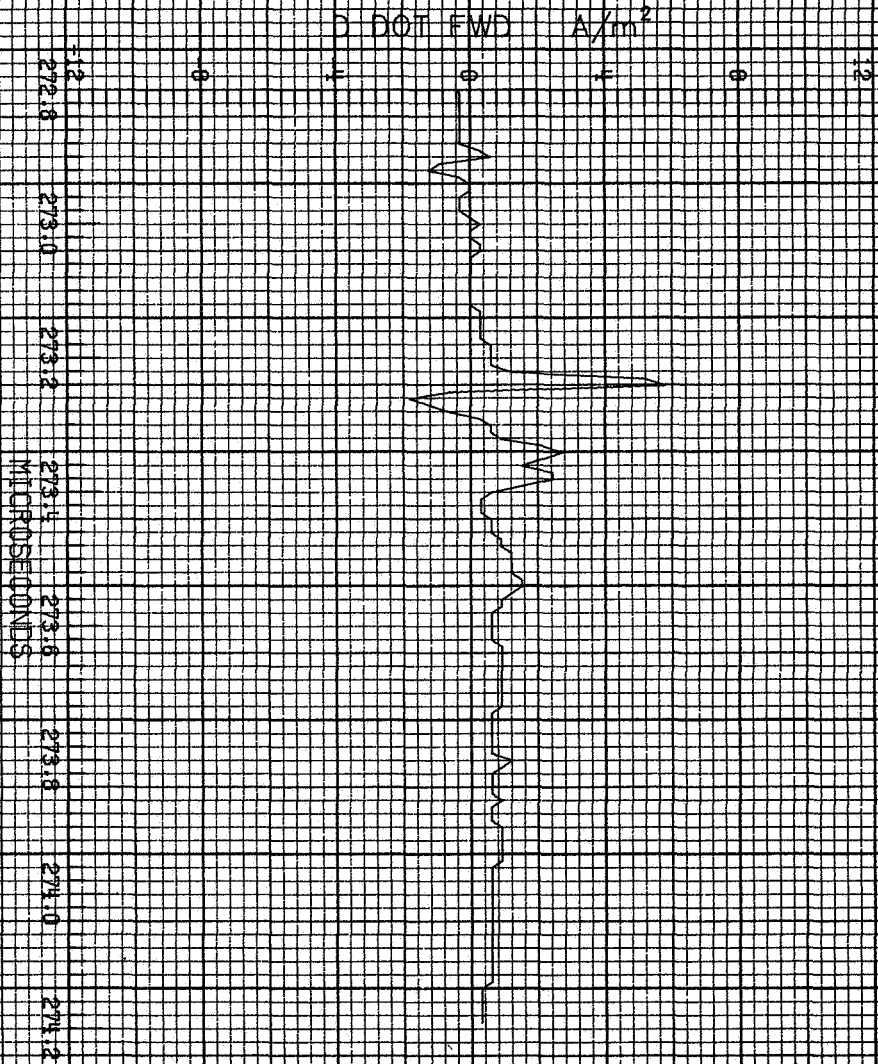


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166 LIGHTNING/PCM/TK10/M. THOMES

TEST NO. 82-624

RUN NO. 9

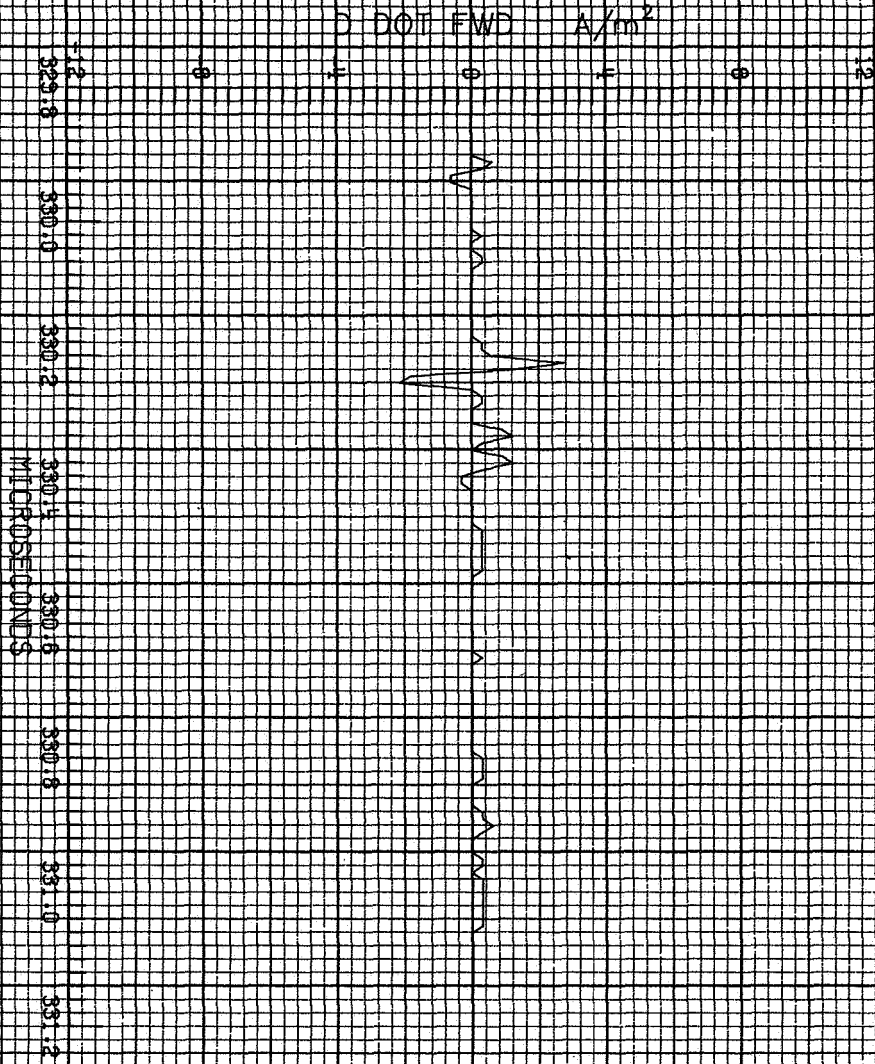


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106 TCHTING/PCM/TK10/M.THOMBS

TEST NO. 82-024

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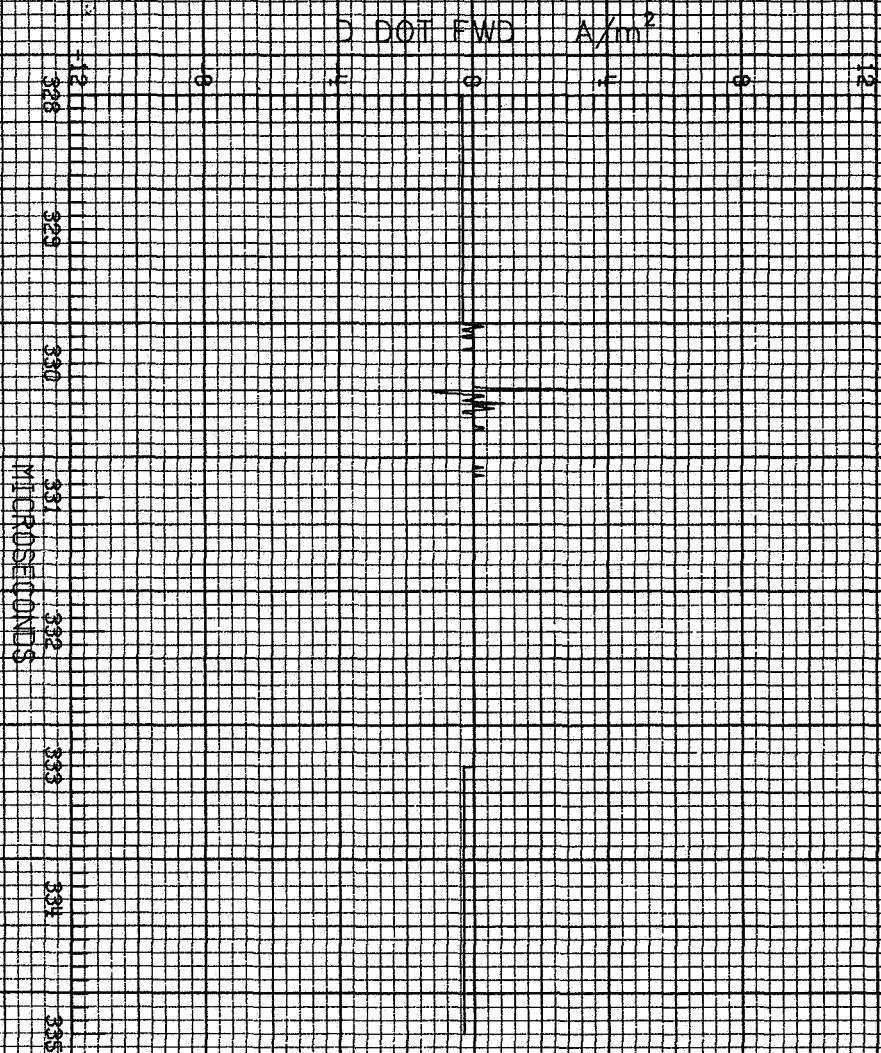


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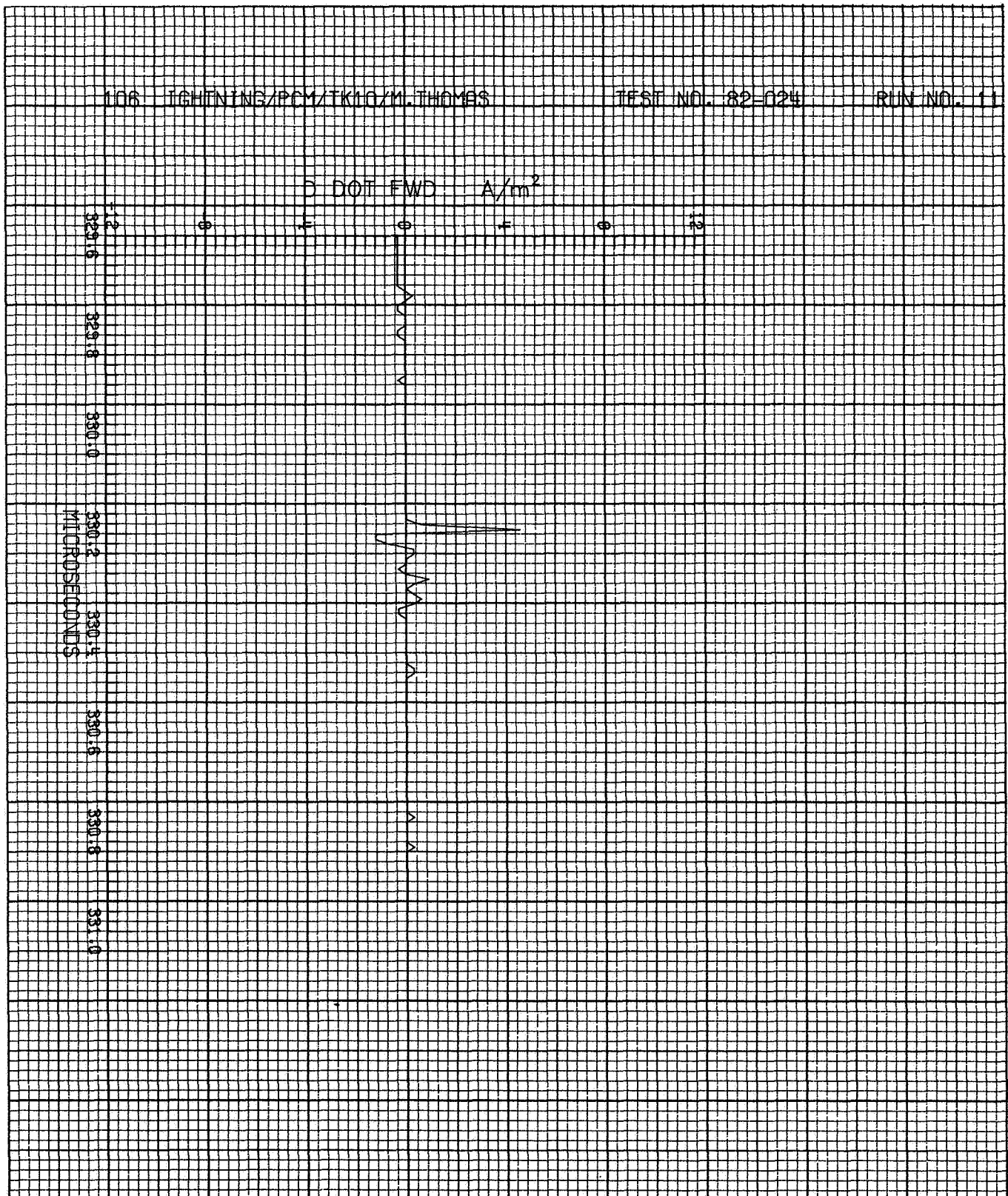
106 LIGHTNING/PCM/TK10/M. THOMAS

TEST NO. 82-024

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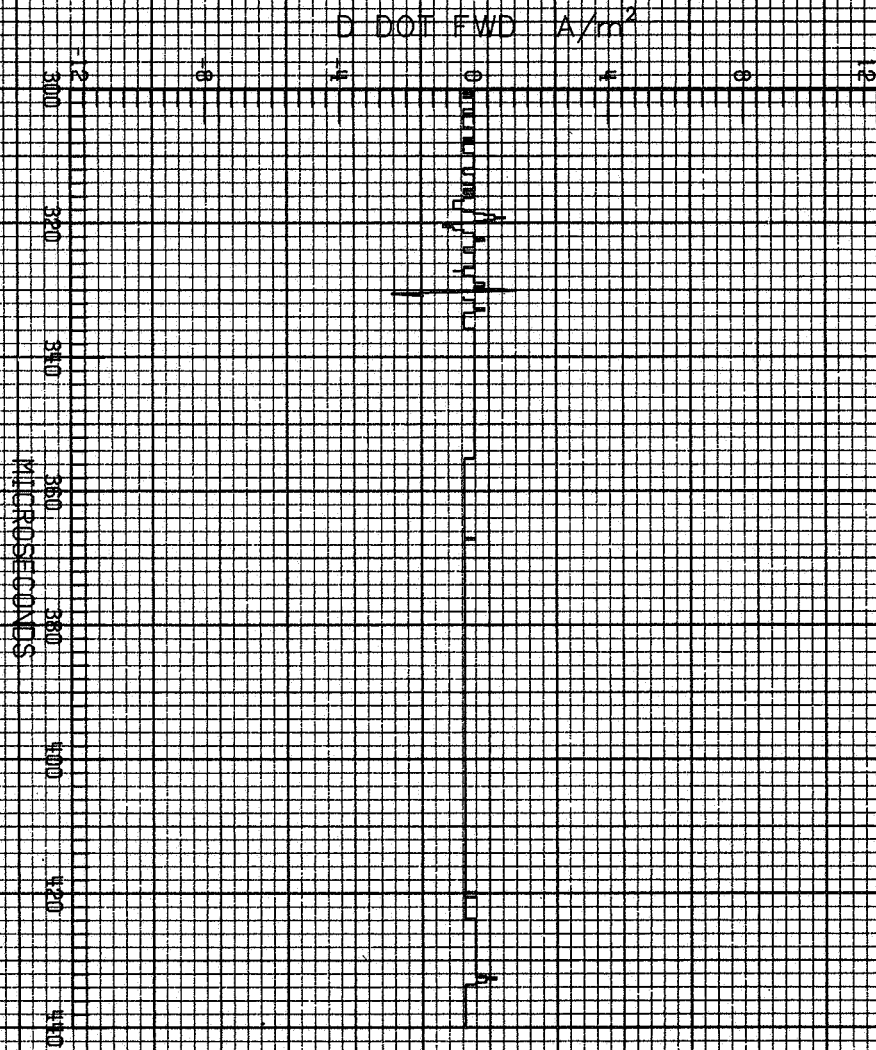


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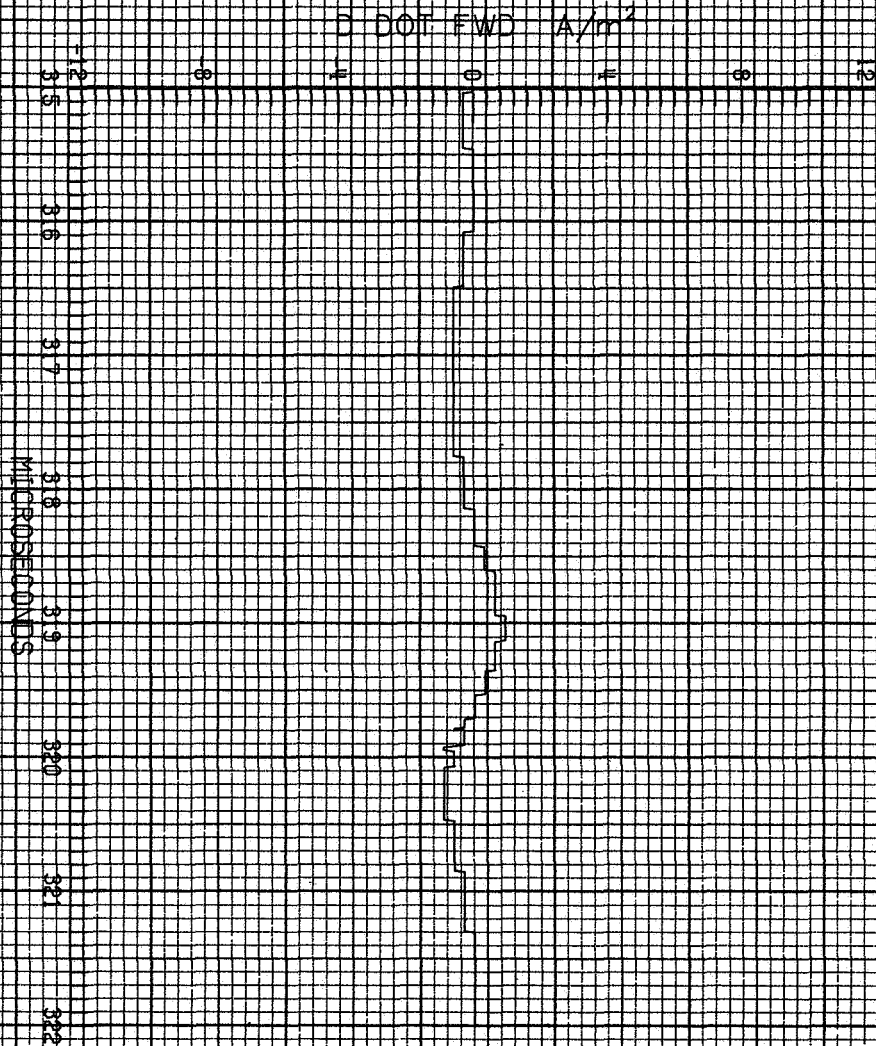
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106 LIGHTNING/PCM/TK10/M. THOMAS

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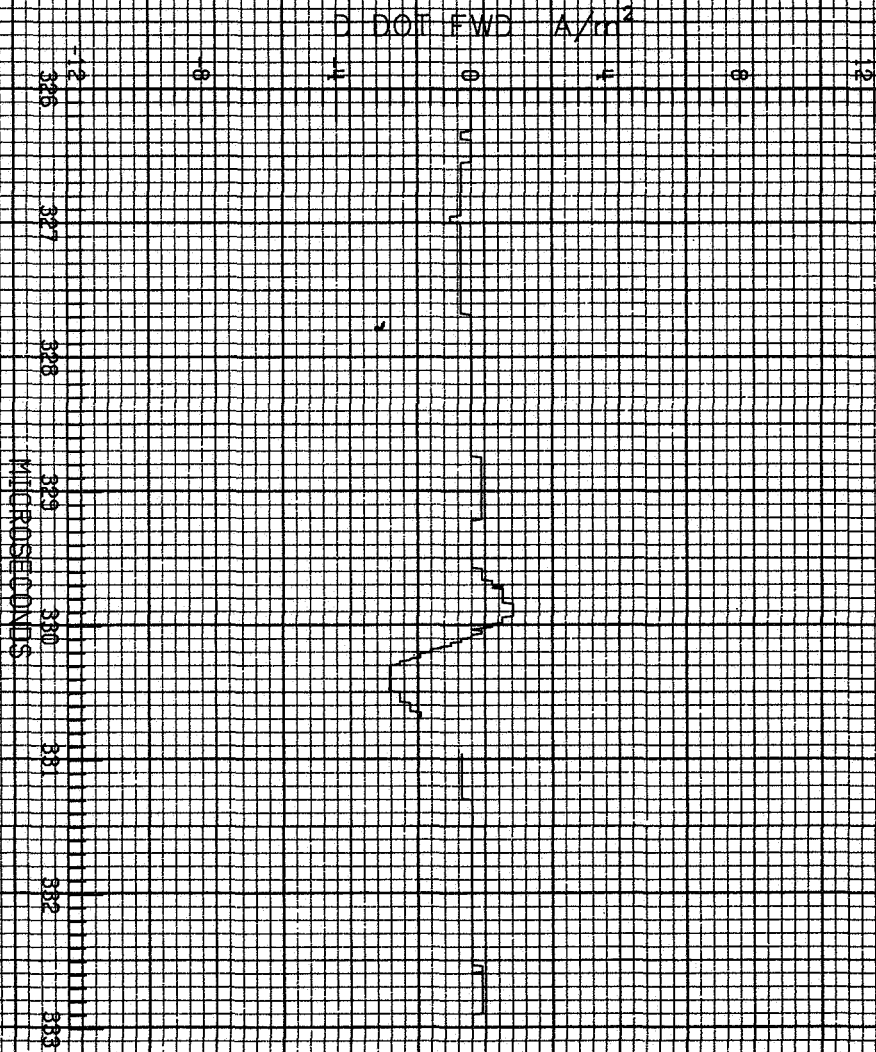


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106 LIGHTNING/PCM/TK10/M. THOMAS

TEST NO. 82-024

RUN NO. 12



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TEST NO. 82-024

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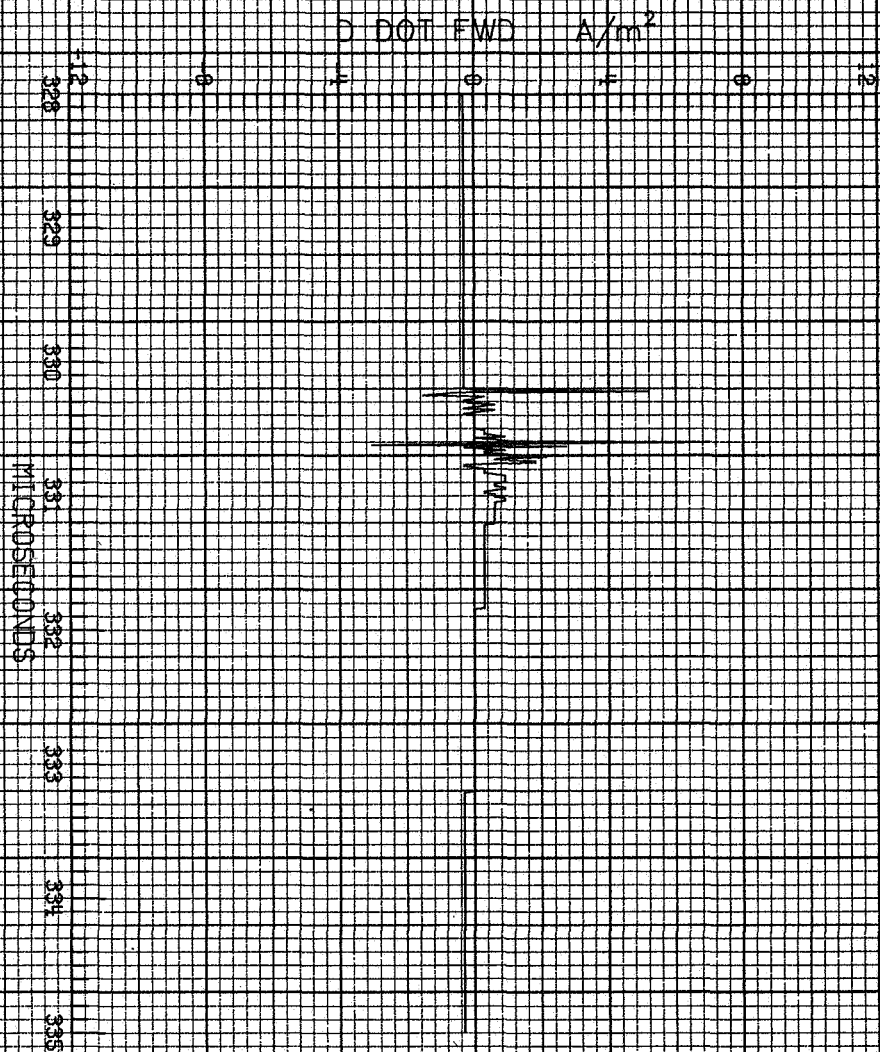


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TEST NO. 82-024

RUN NO. 14



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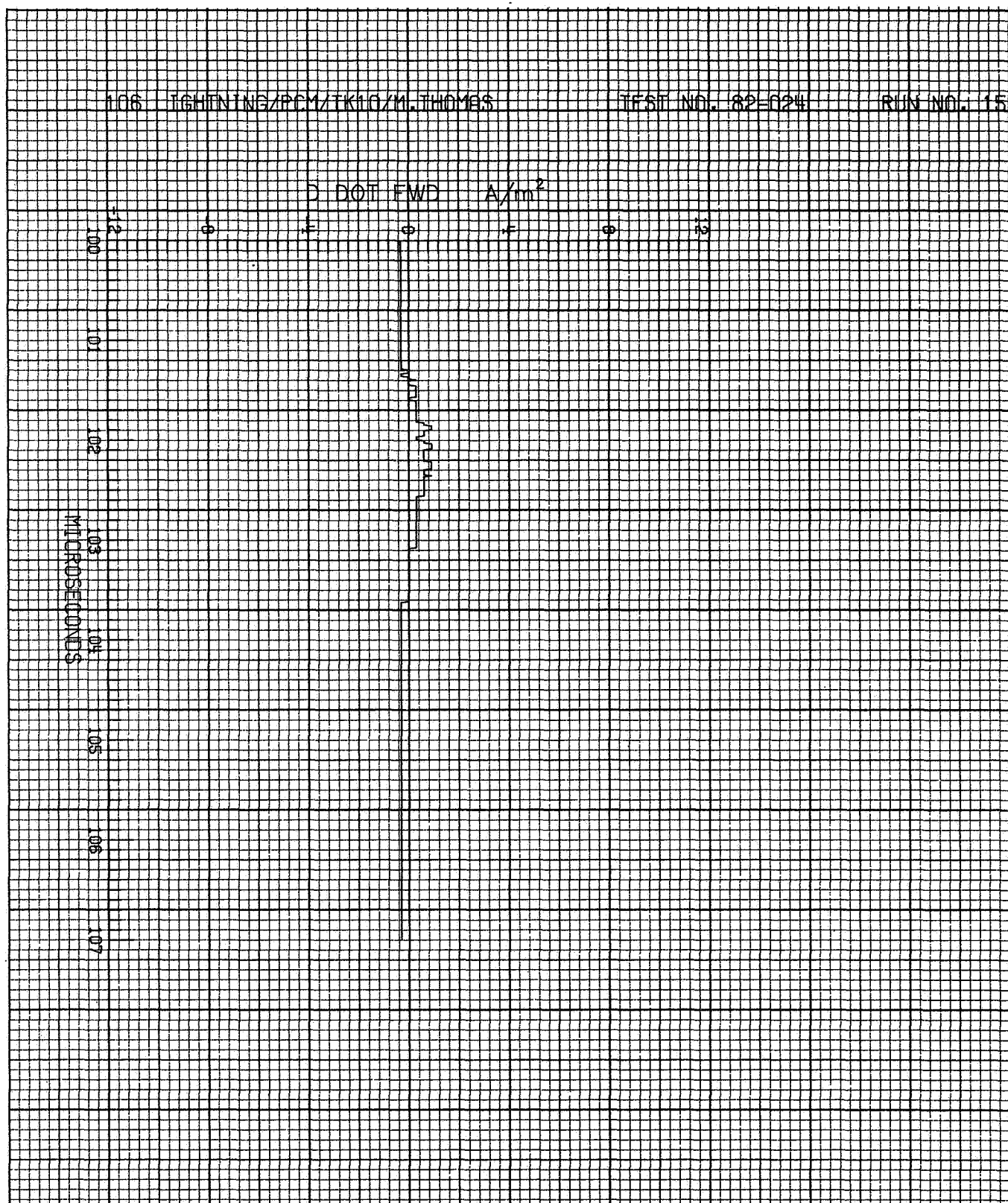
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TEST NO. 82-024

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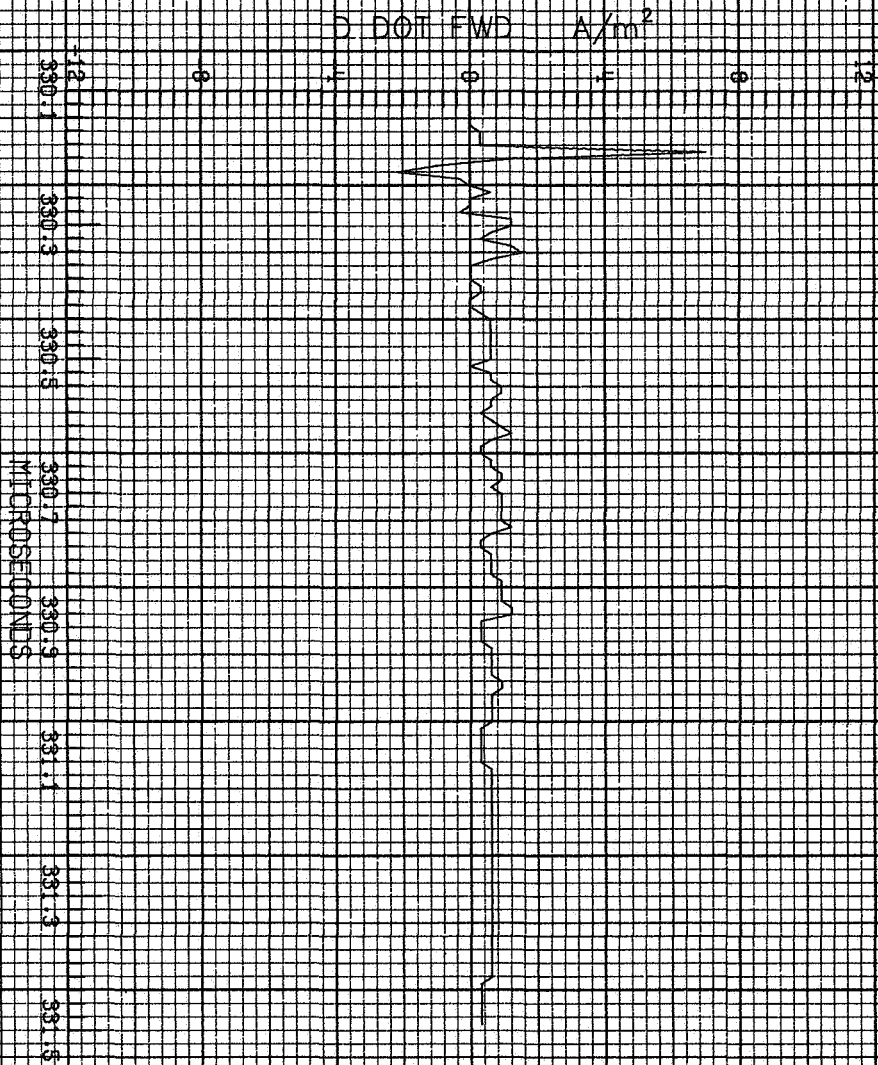
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106. LIGHTNING/PCM/TK10/M. THOMAS

TEST NO. 82-024

RUN NO. 15

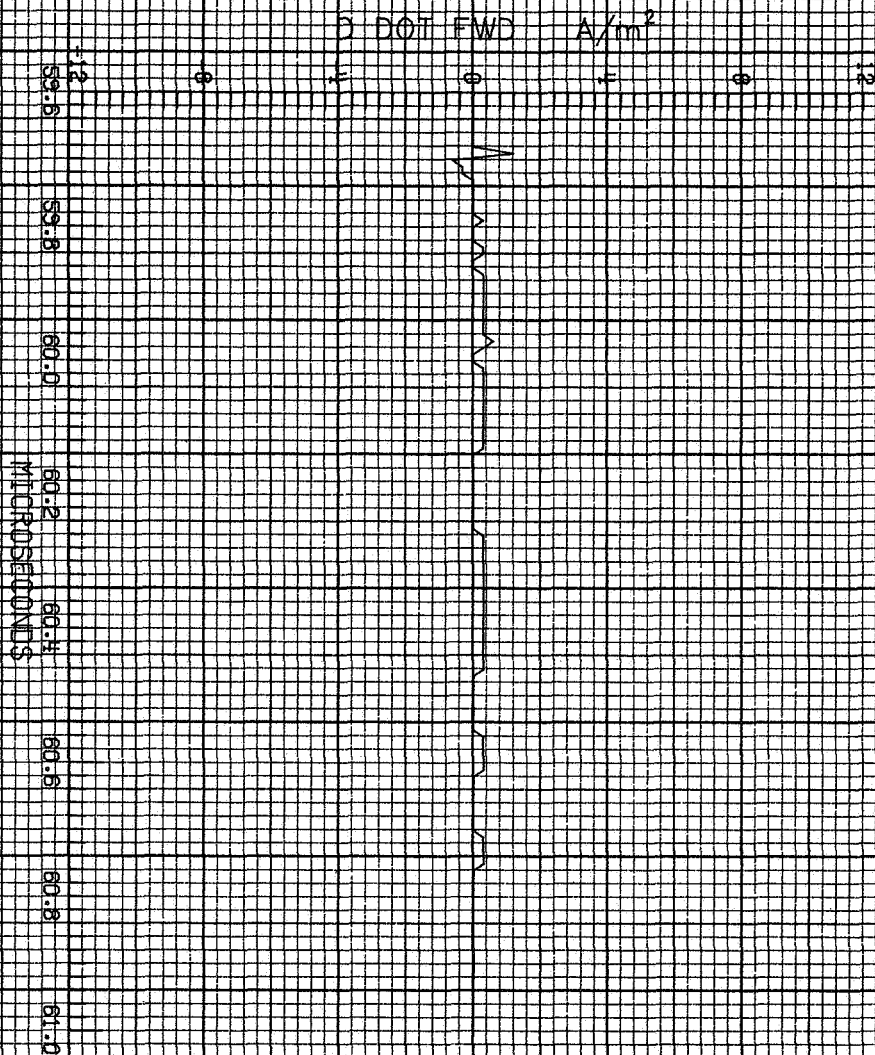


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TEST NO. 82-024

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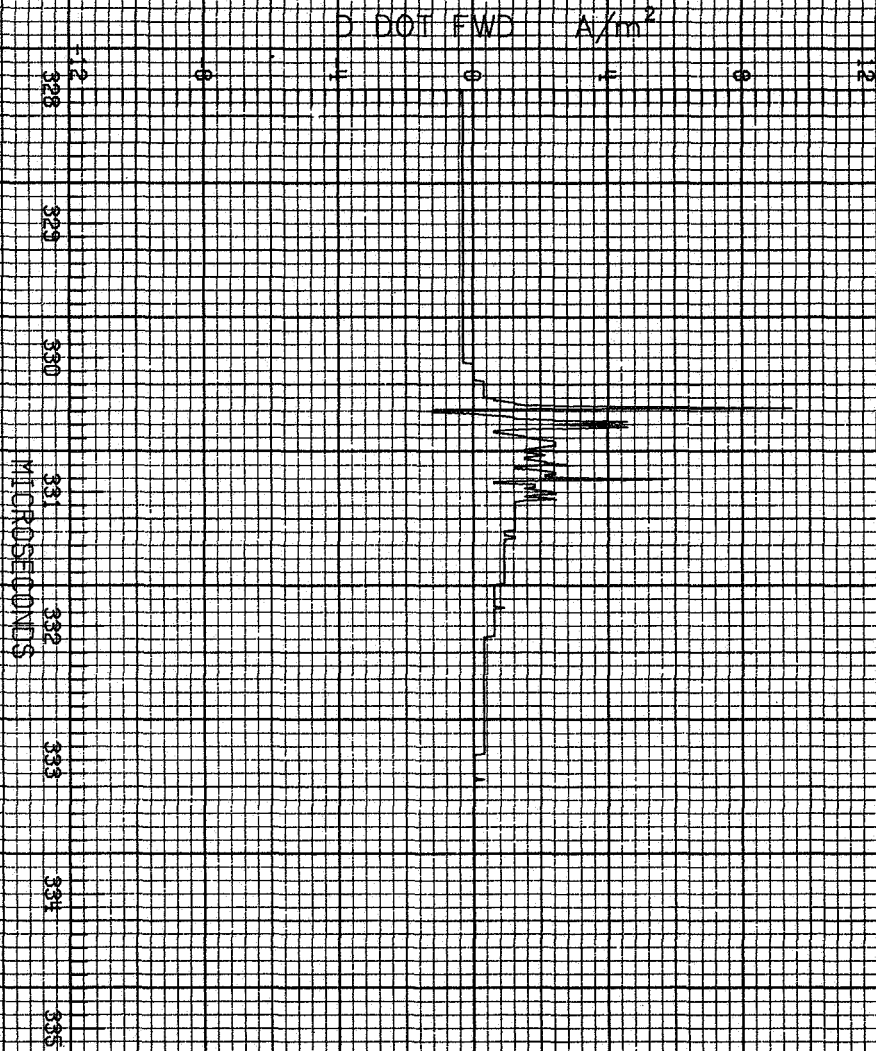


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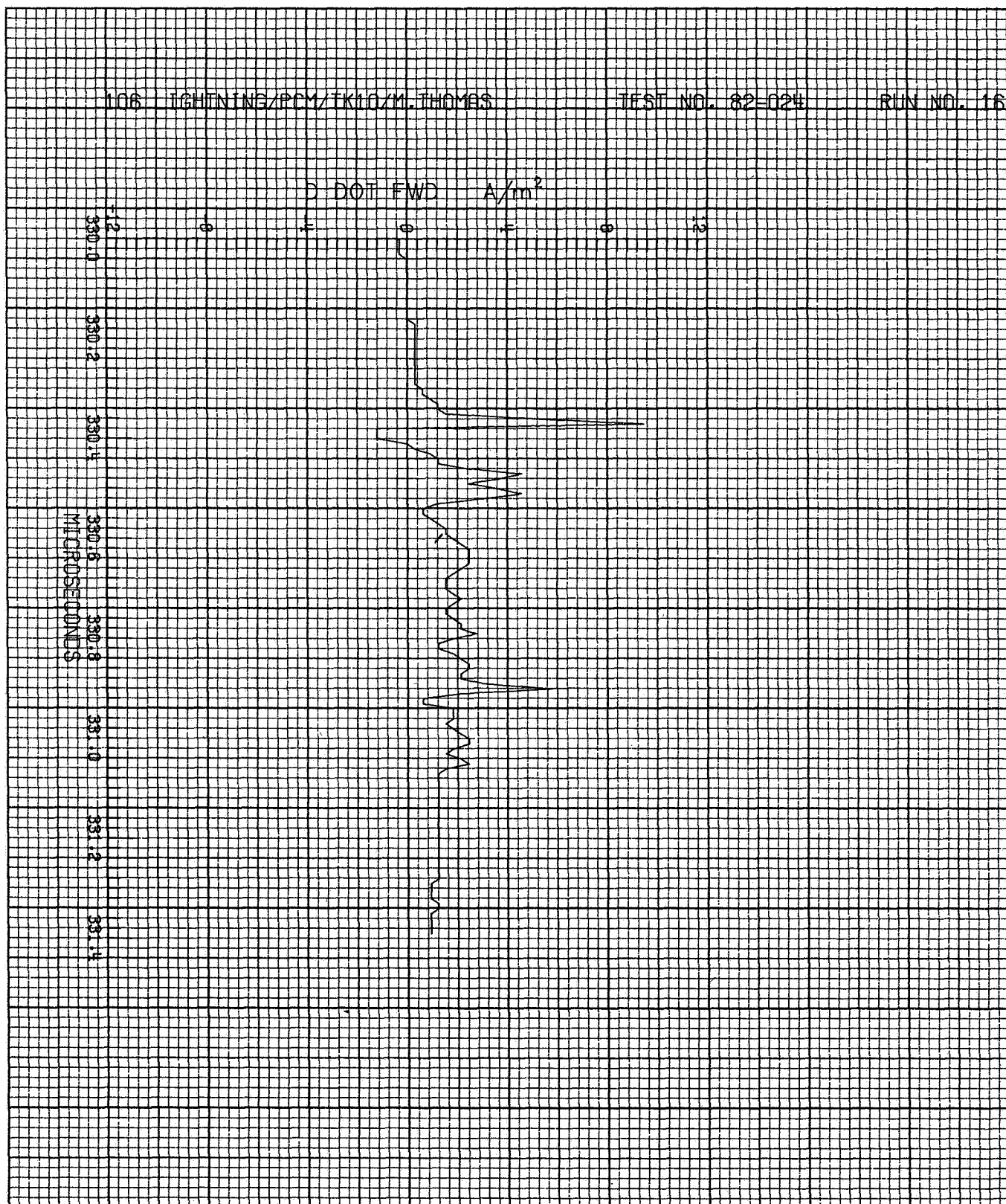
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TEST NO. 82-024

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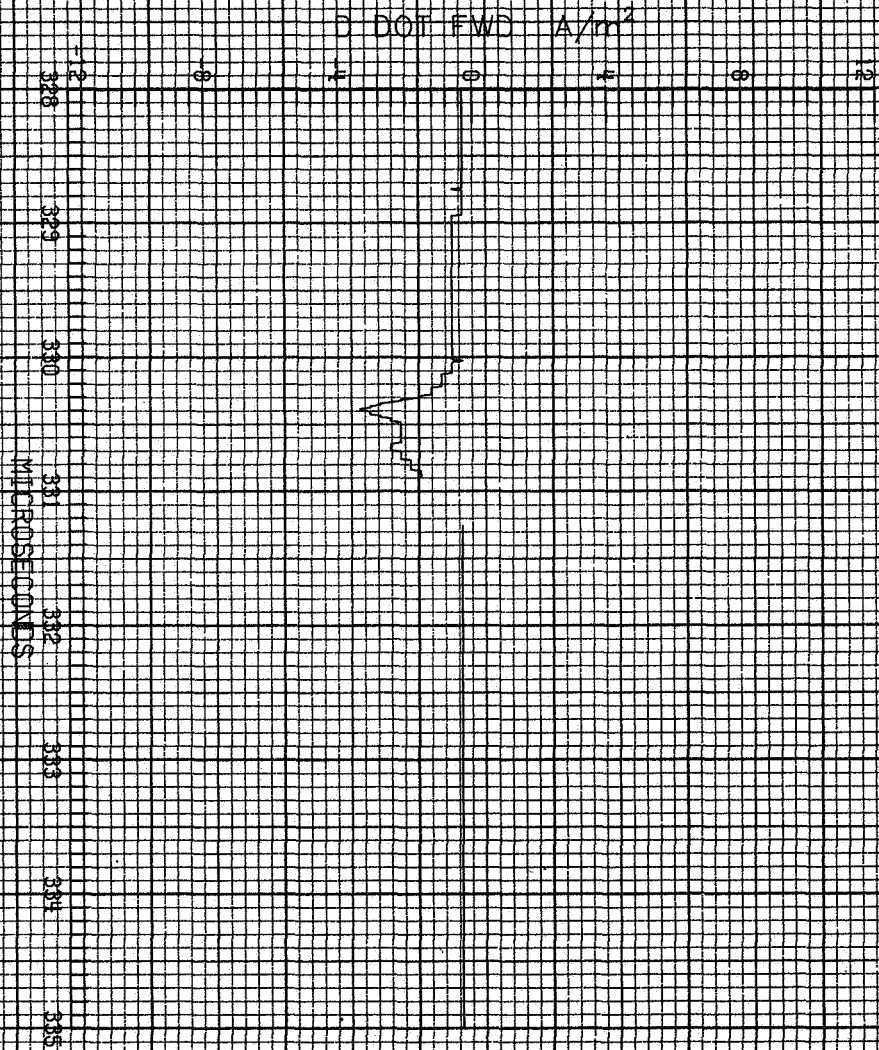


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TEST NO. 82-024

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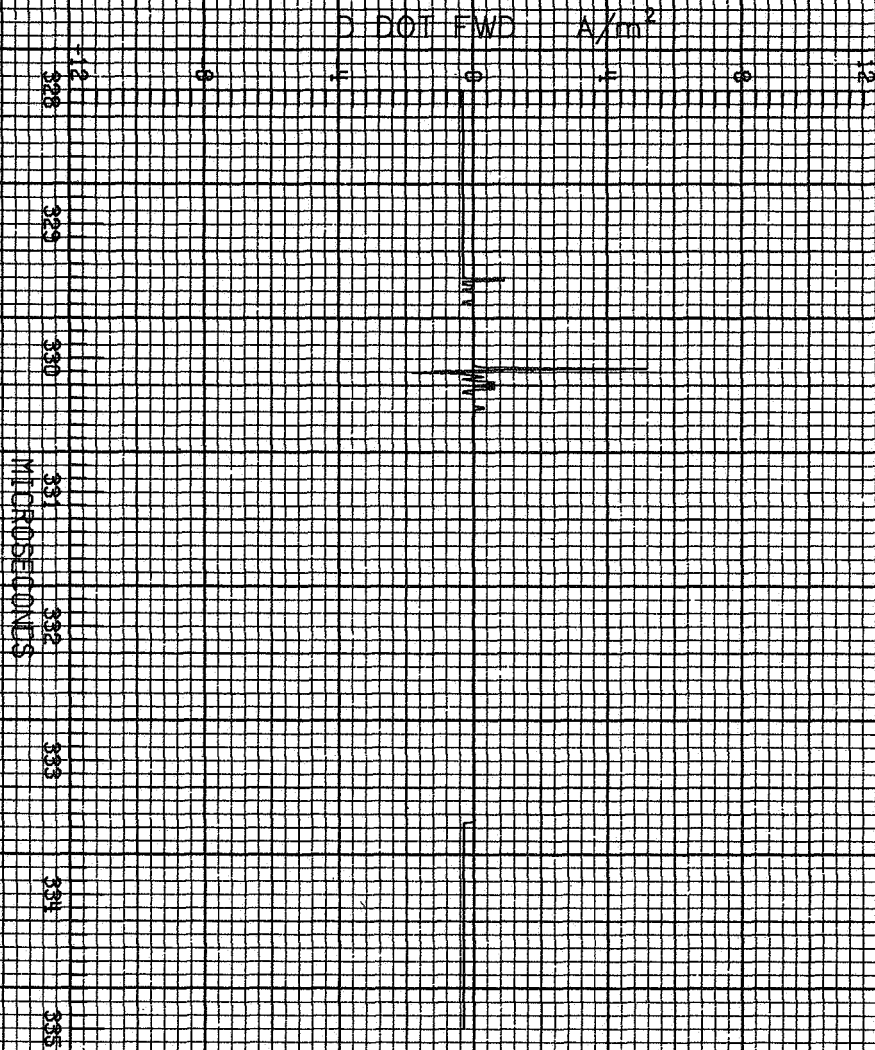


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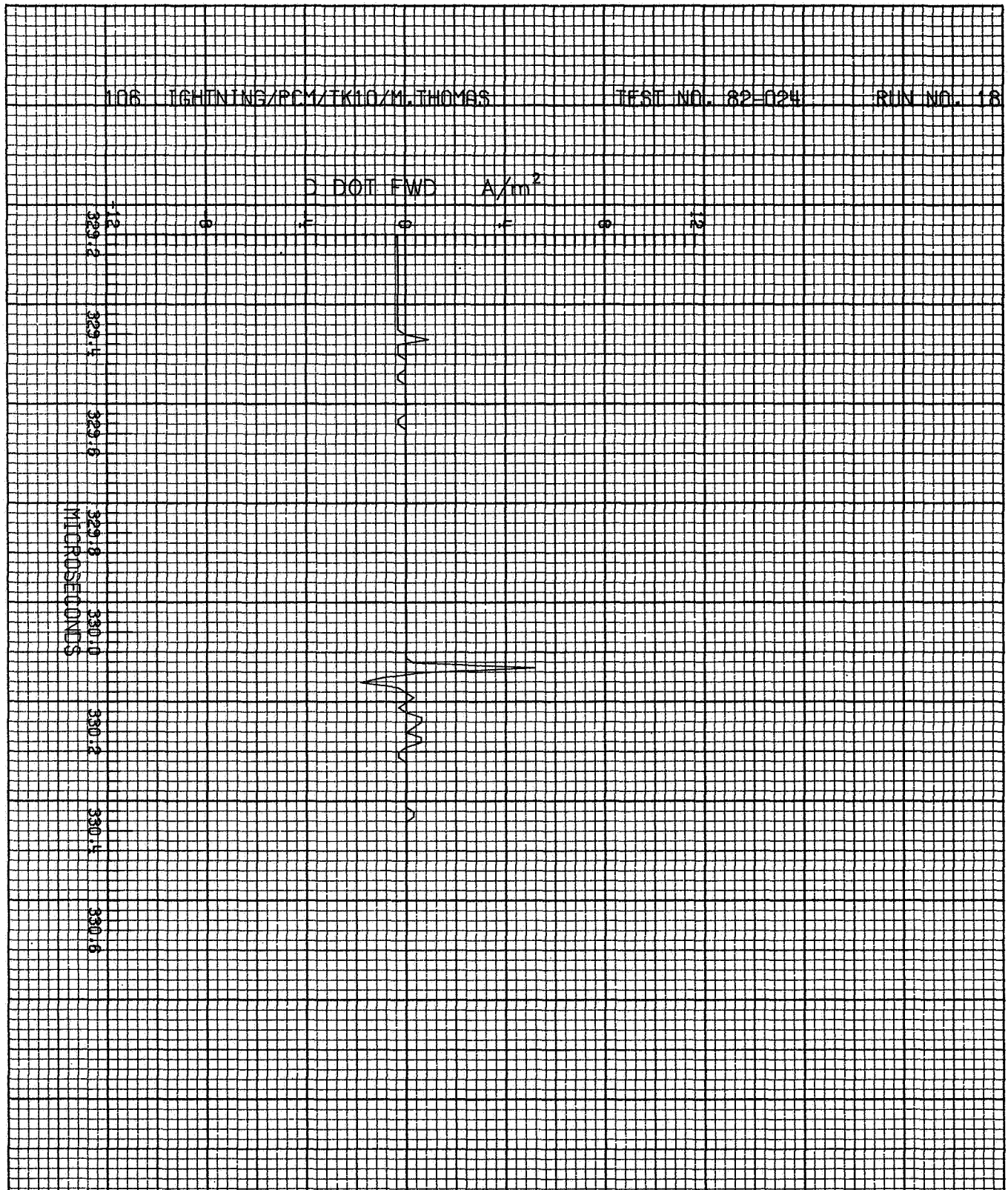
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TEST NO. 82-024

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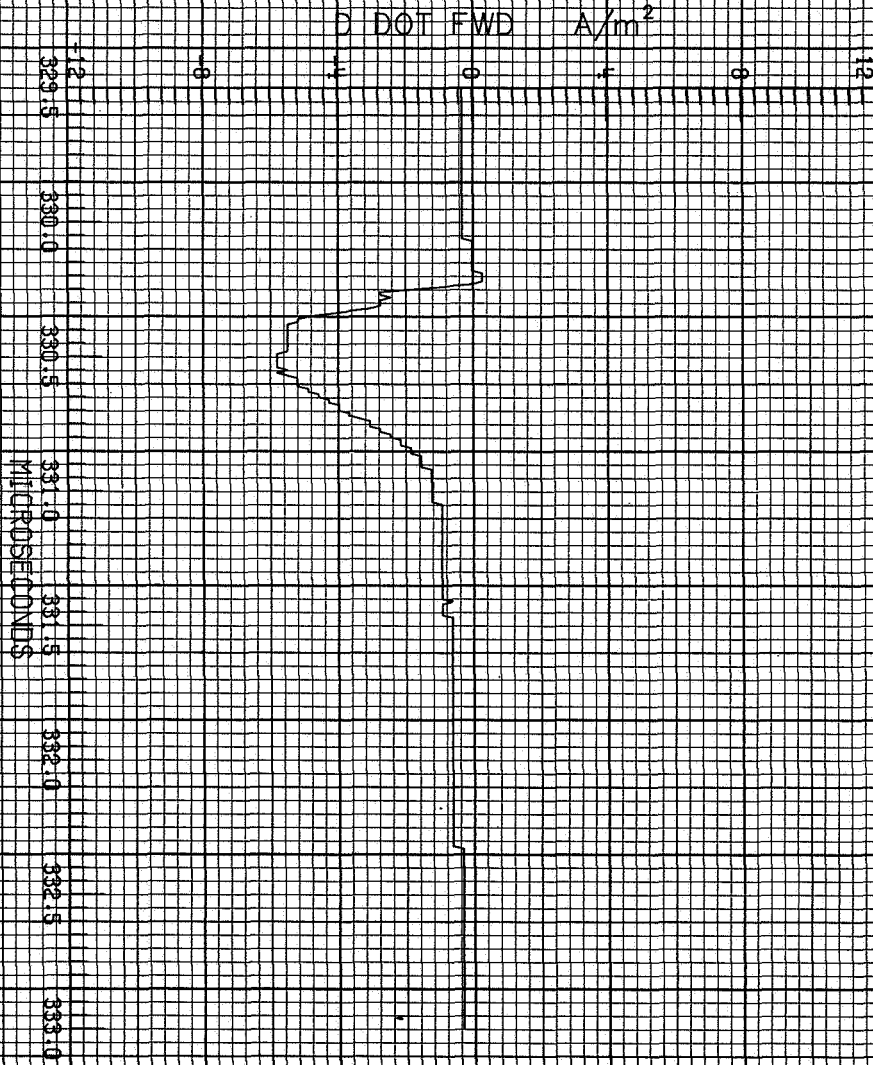


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F106 LIGHTNING/TK10/PCM/M. THOMAS

TEST NO. 82-026

RUN NO. 1

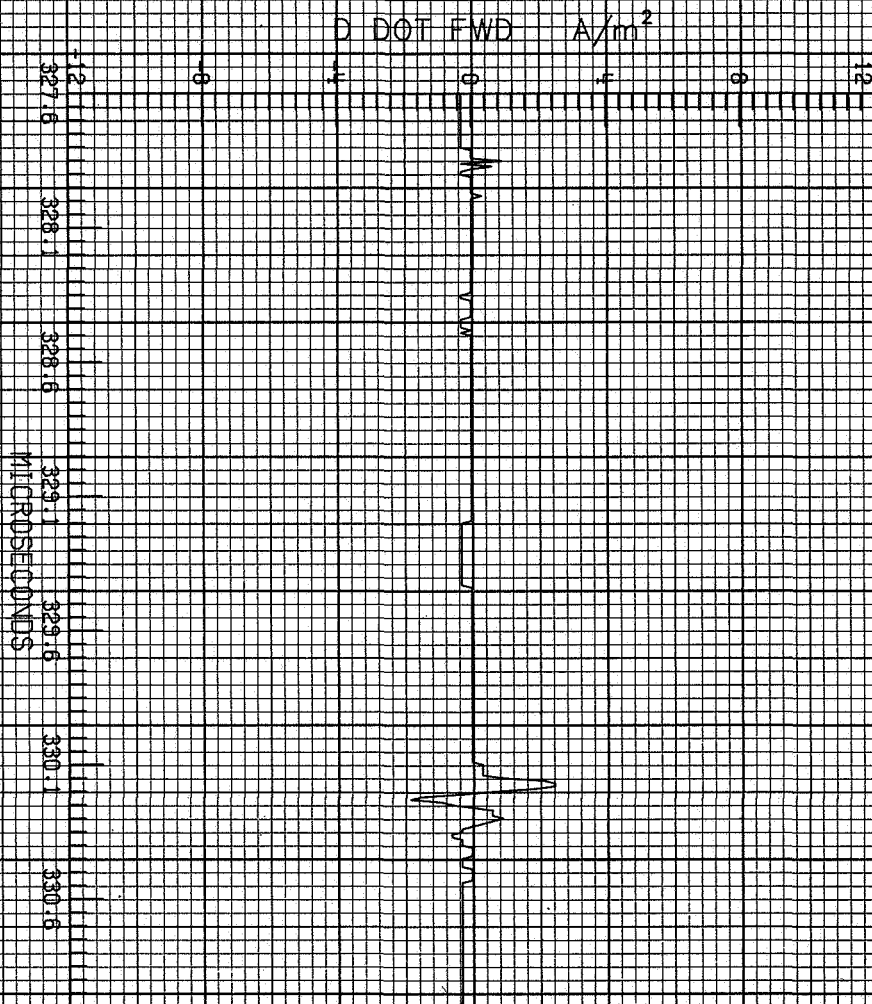


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F106 LIGHTNING/TK10/PCM/M. THOMAS

TEST NO. 82-026

RUN NO. 2

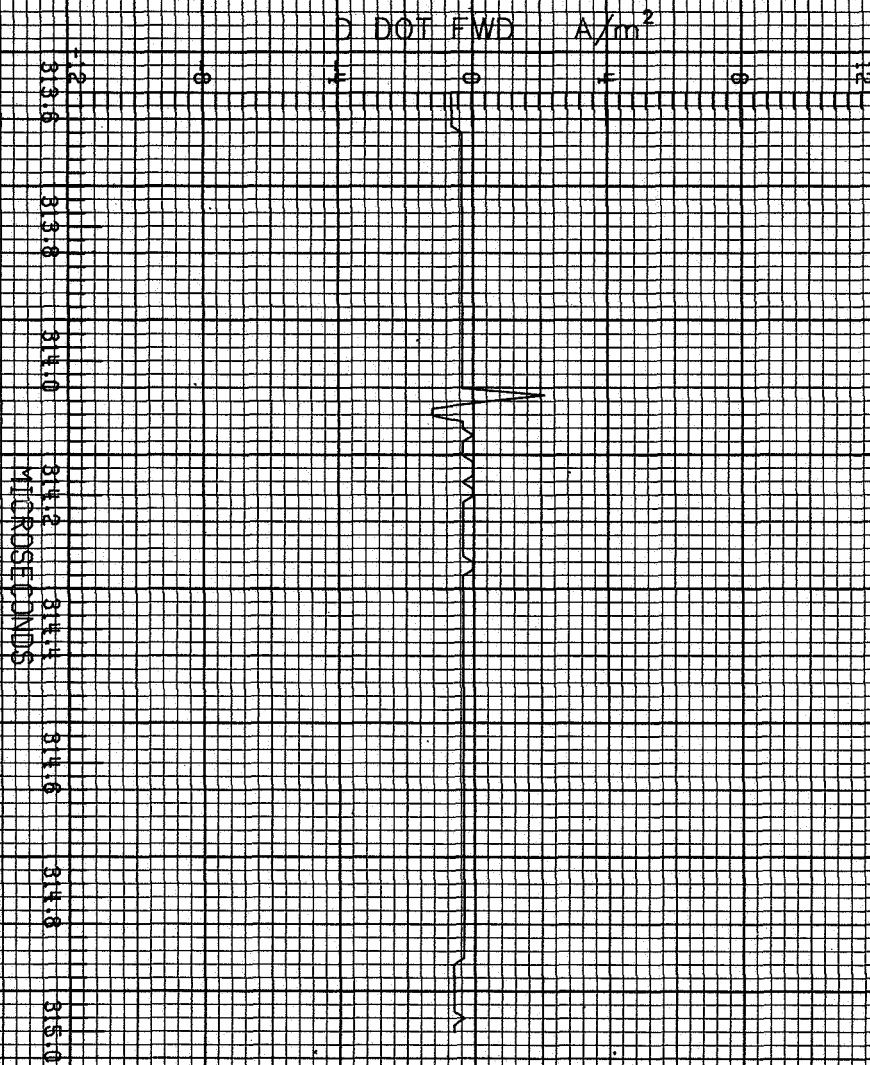


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F106 LIGHTNING/TK10/PCM/M. THOMAS

TEST NO. 82-026

RUN NO. 3

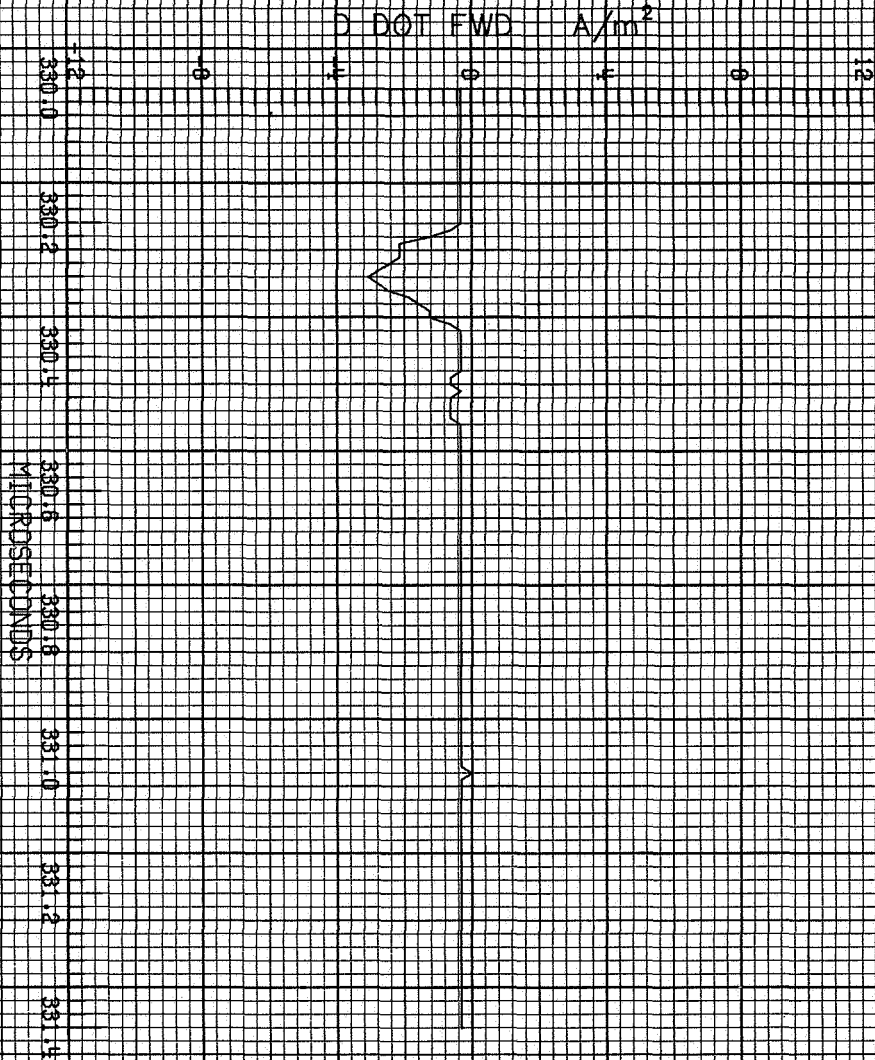


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F106 LIGHTNING/TK10/PCM/M.THOMAS

TEST NO. 82-026

RUN NO. 3

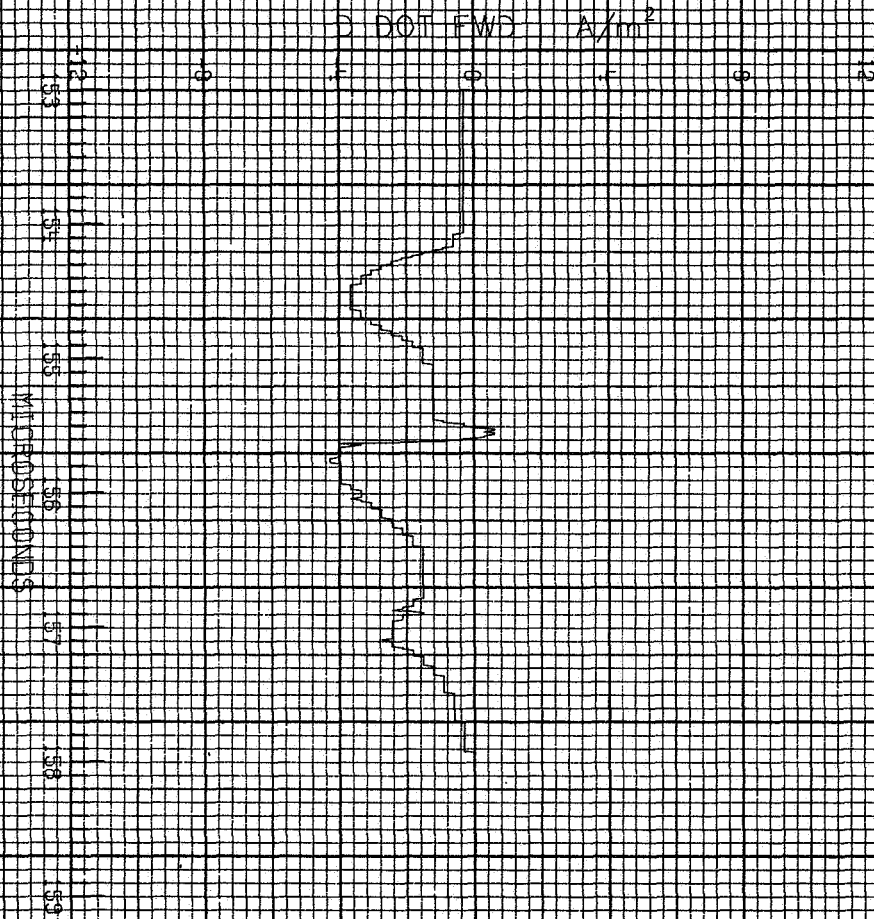


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F105 LIGHTNING/FK10/PCM/M. THOMBS

TEST NO. 82-027

RUN NO.

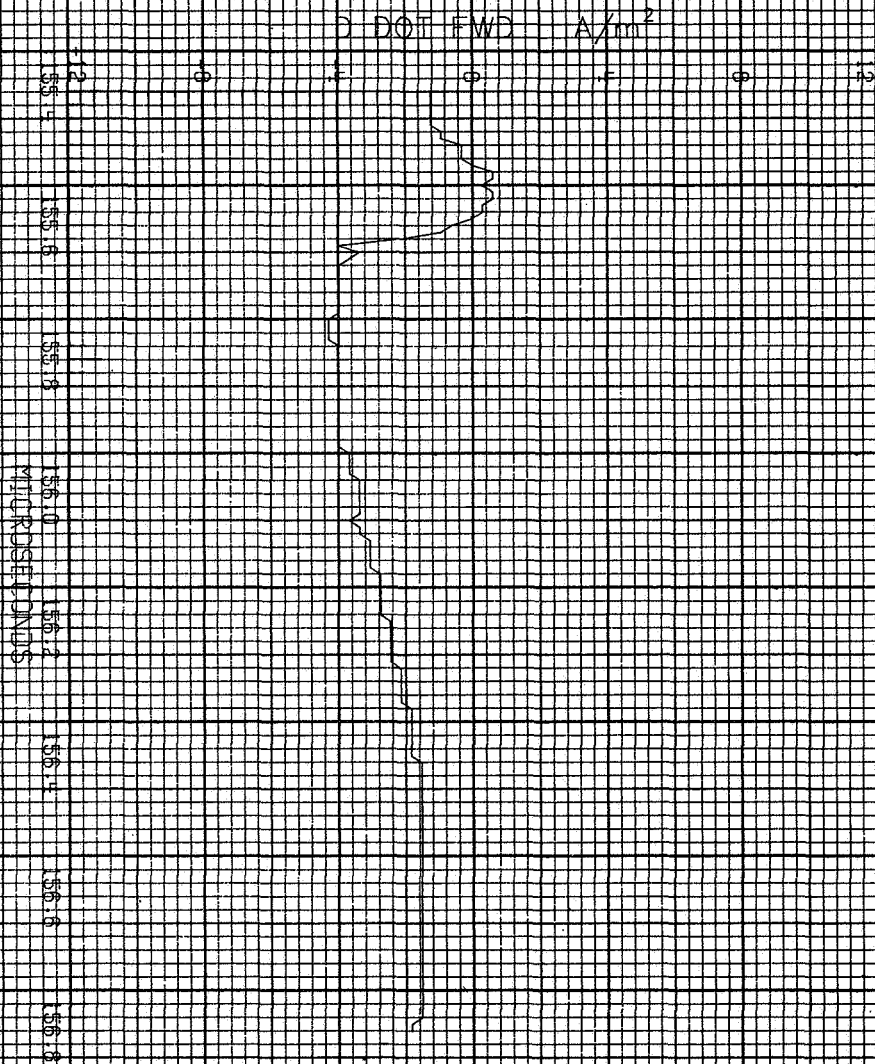


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F106 LIGHTNING/TK10/PCM/M.THOMAS

TEST NO. 82-027

RUN NO. 1



F106 LIGHTNING/TK10/PCM/M. THOMAS

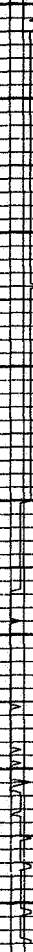
TEST NO. 82-027

RUN NO. 2

5 DOT FWD A/mm^2

276.0
276.5
277.0
277.5
278.0
278.5
279.0
279.5
MICROSECONDS

0 1 2 3 4 5



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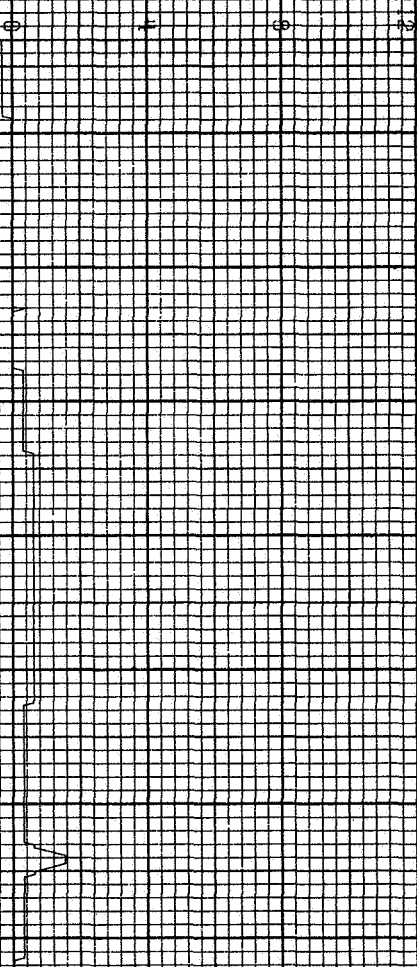
F106 LIGHTNING/TK10/PCM/M. THOMAS

TEST NO. 82-027

RUN NO. 2

DOT FWD A/m^2

304.5
305.0
305.5
306.0
306.5
307.0
307.5
308.0
MICROSECONDS

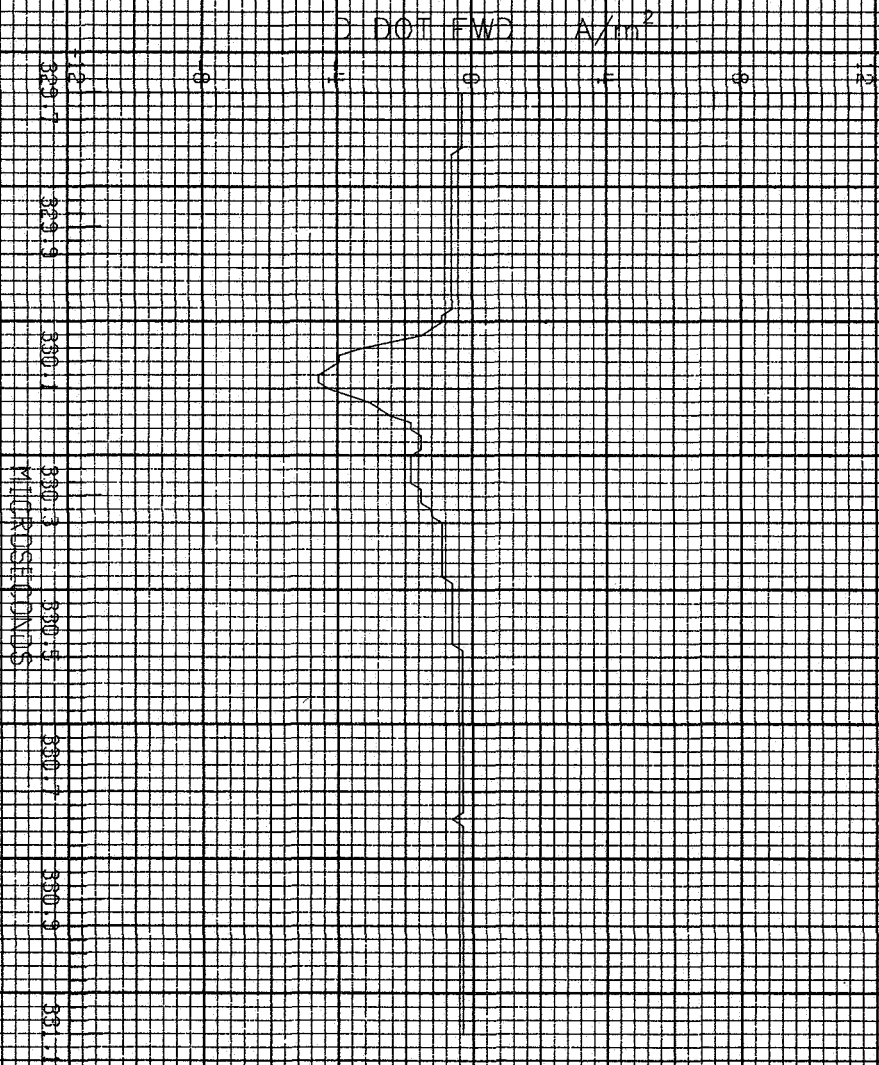


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F106 LIGHTNING/TK10/PCM/M. THOMAS

TEST NO. 82-027

RUN NO. 2



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F106 LIGHTNING/TK10/PCM/M. THOMAS

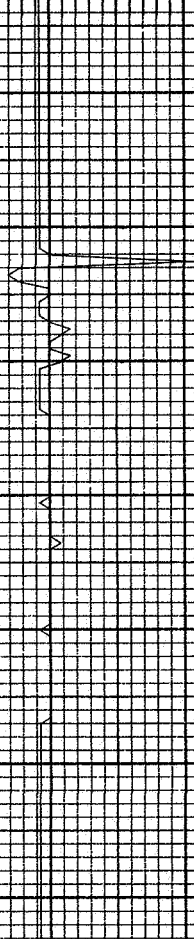
TEST NO. 82-627

RUN NO. 3

D DOT FWD A/m^2

12
329.8
330.0
330.2
330.4
330.6
330.8
331.0
331.2
MICROSECONDS

0 10 20 30 40 50

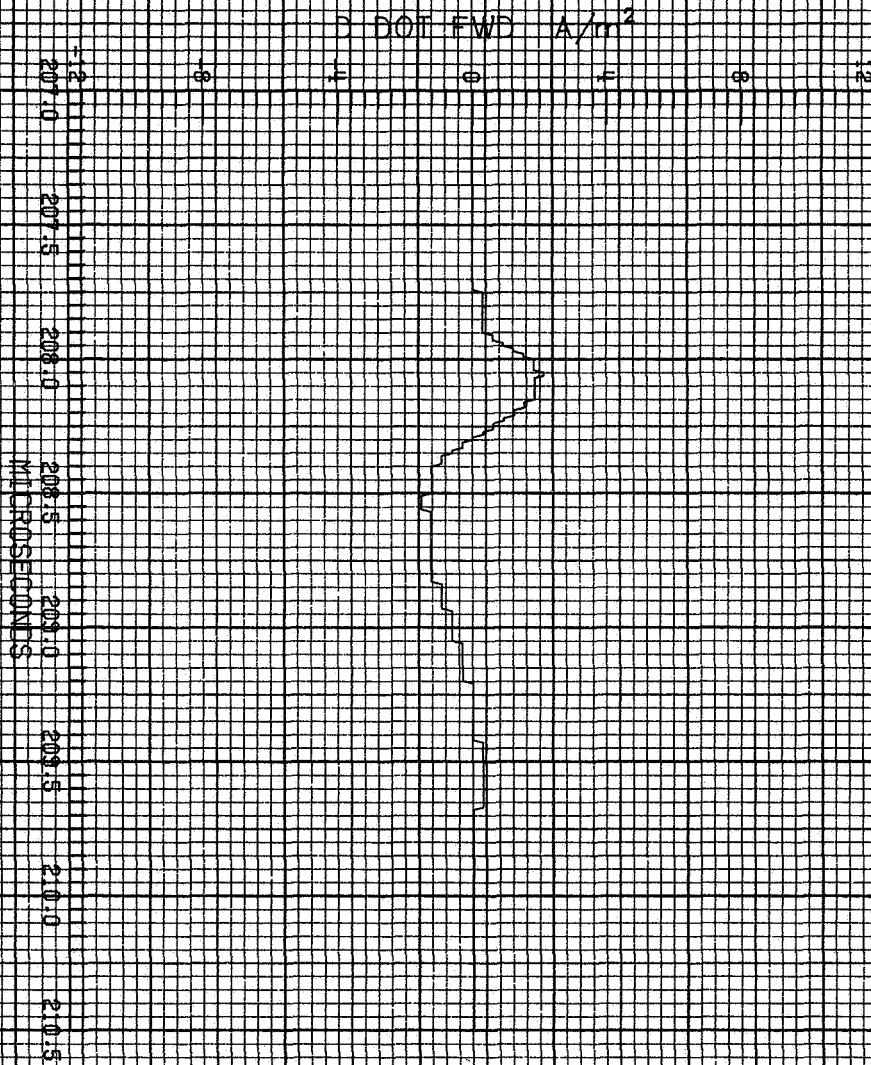


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F106 LIGHTNING/TK10/PCM/M. THOMAS

TEST NO. 82-028

RUN NO. 1

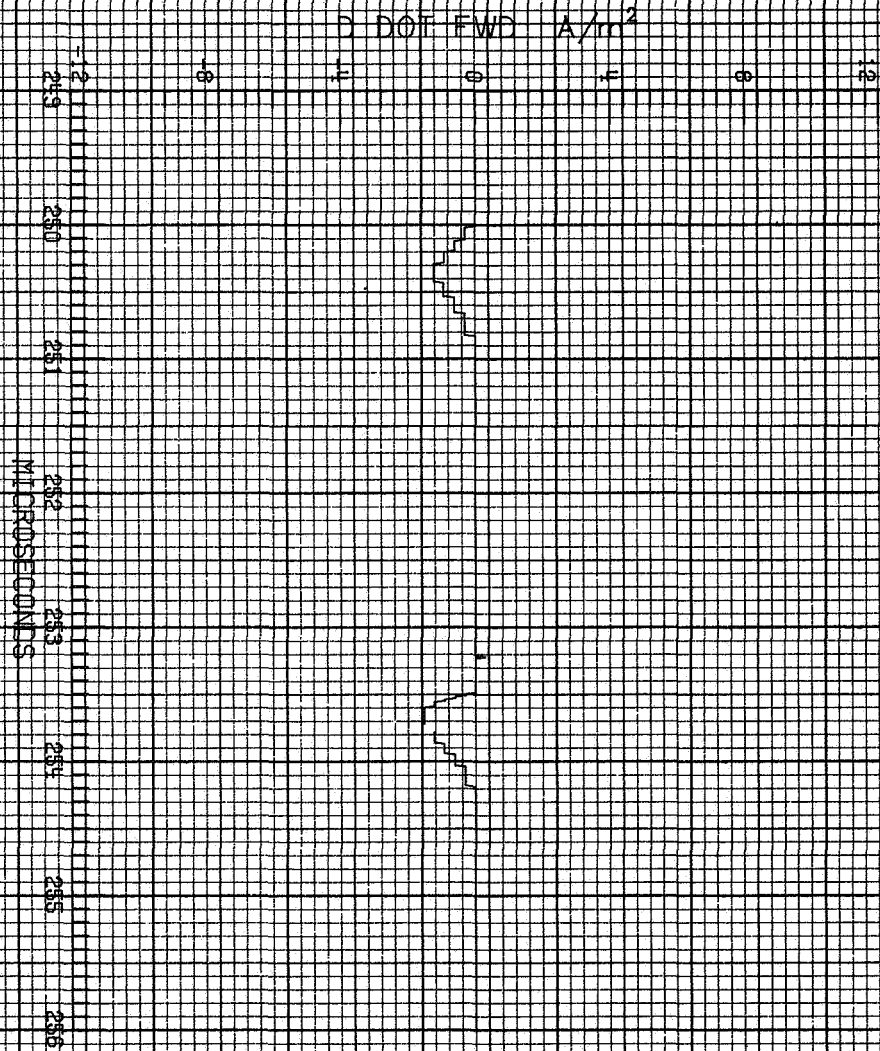


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F106 LIGHTNING/TK10/PCM/M. THOMAS

TEST NO. 82-028

RUN NO. 1

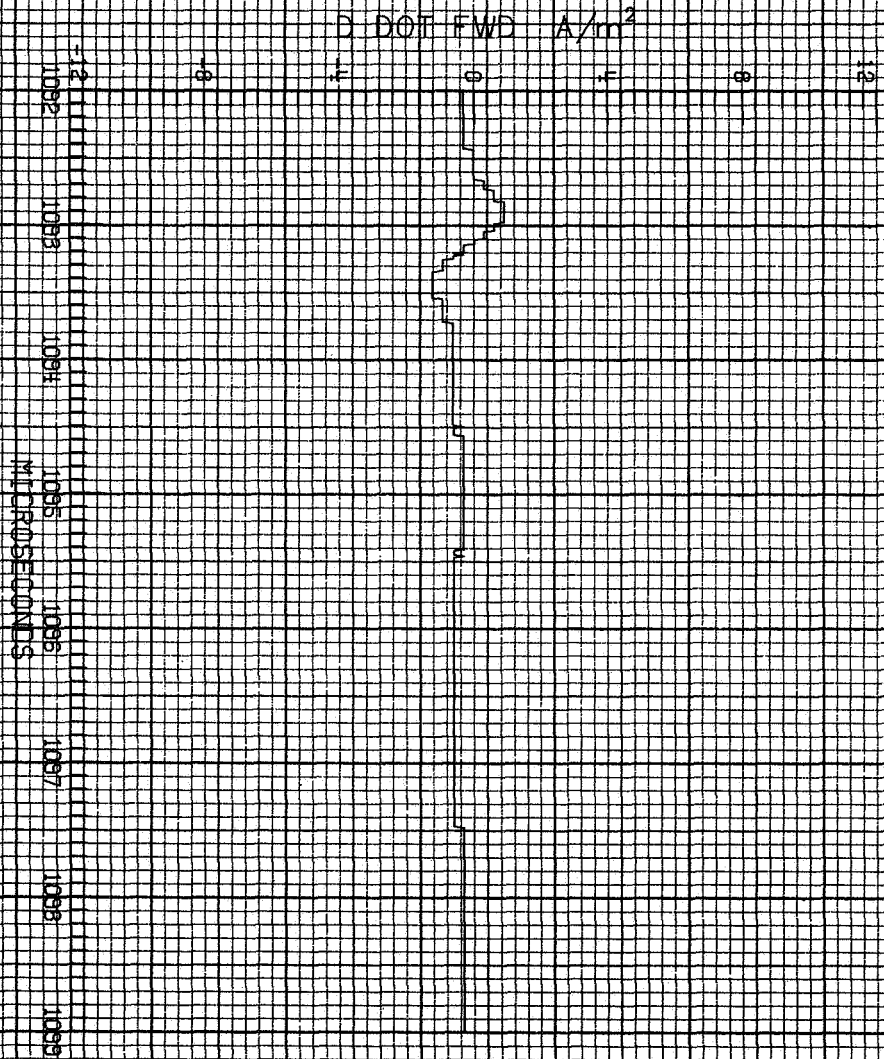


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F106 LIGHTNING/TK10/PCM/M. THOMAS

TEST NO. 82-028

RUN NO. 1

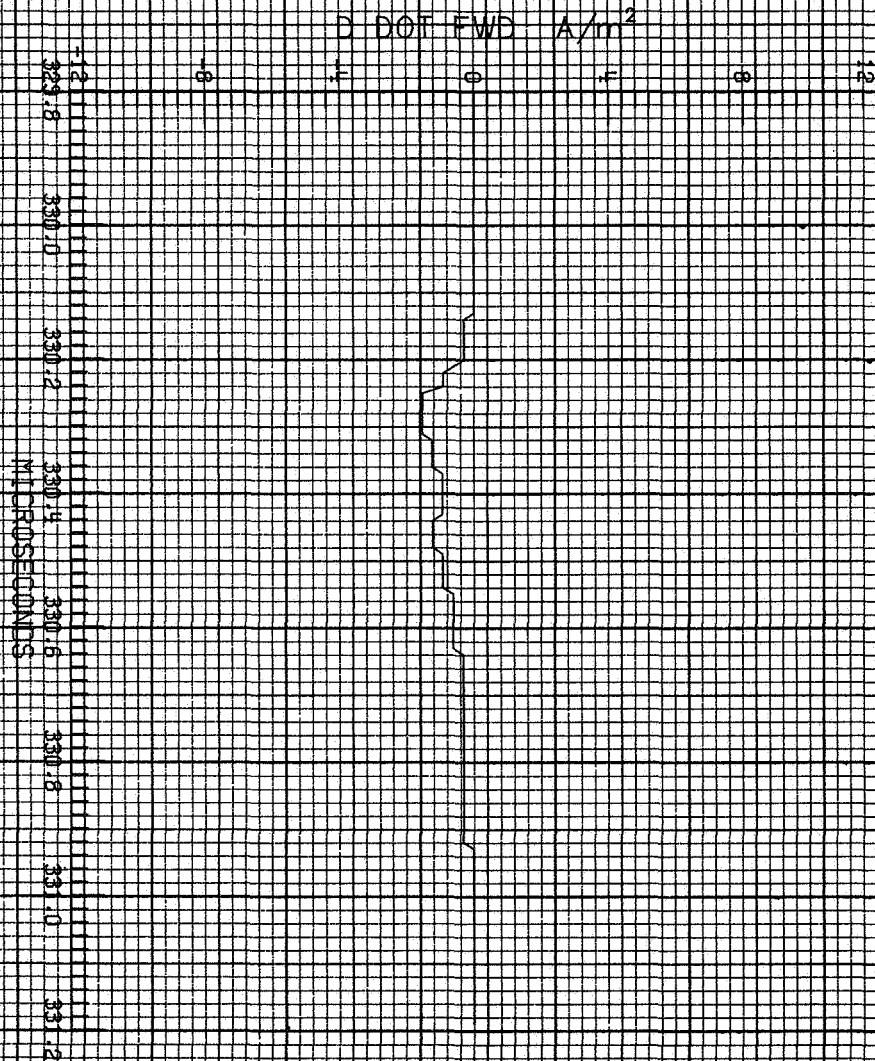


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F106 LIGHTNING/TK10/PCM/M. THOMAS

TEST NO. 82-028

RUN NO. 2

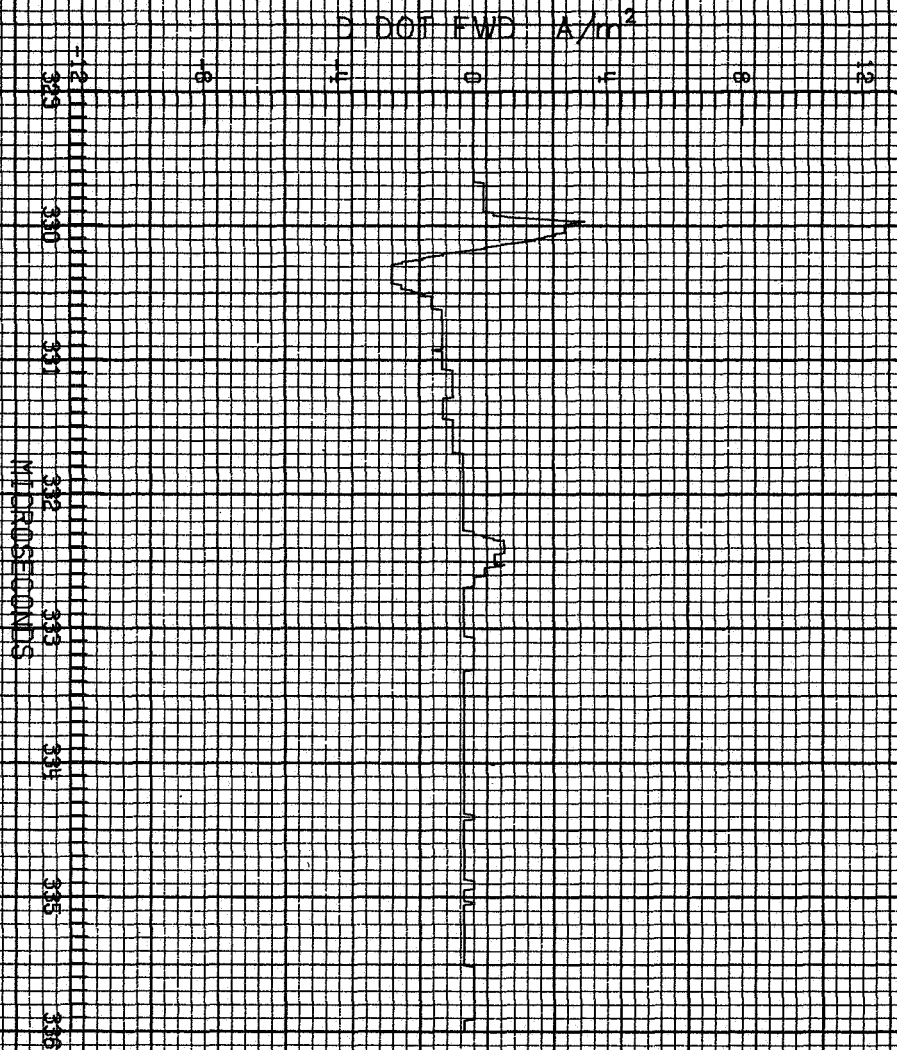


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F106 LIGHTNING/TK10/PCM/M. THOMAS

TEST NO. 82-028

RUN NO. 3

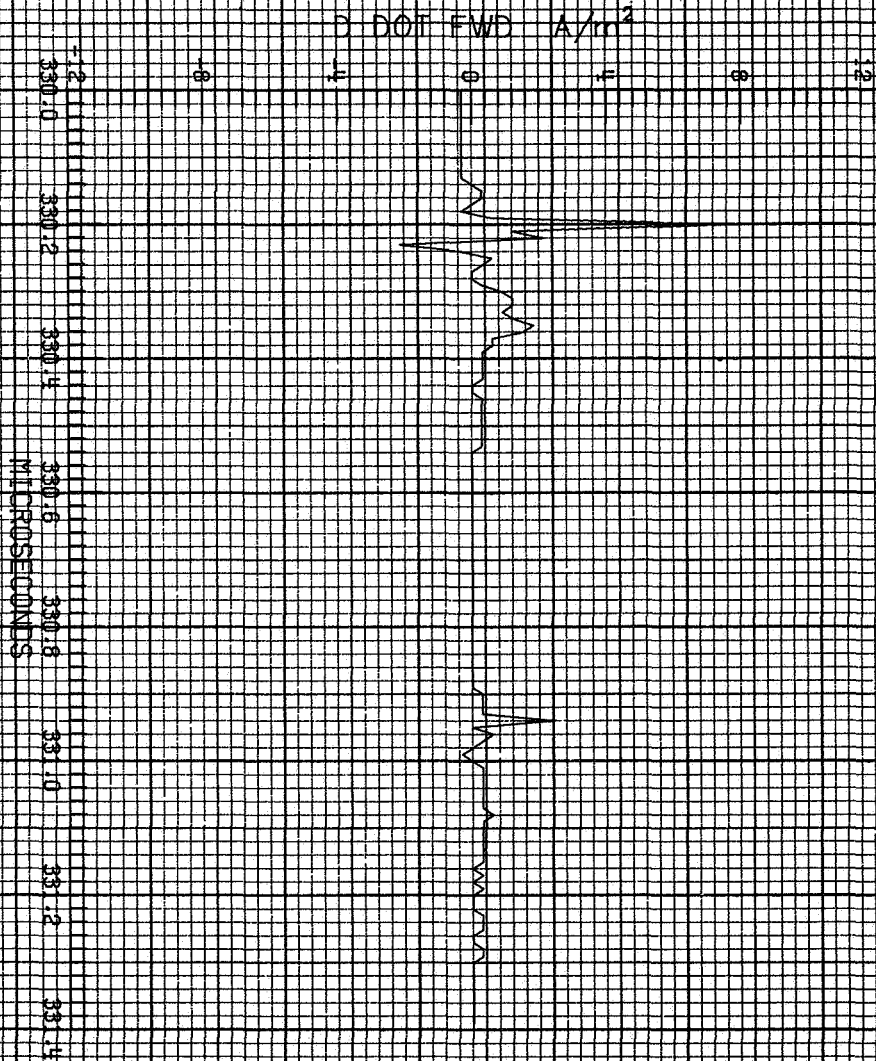


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F106 LIGHTNING/TK10/PCM/M. THOMAS

TEST NO. 82-028

RUN NO. 4

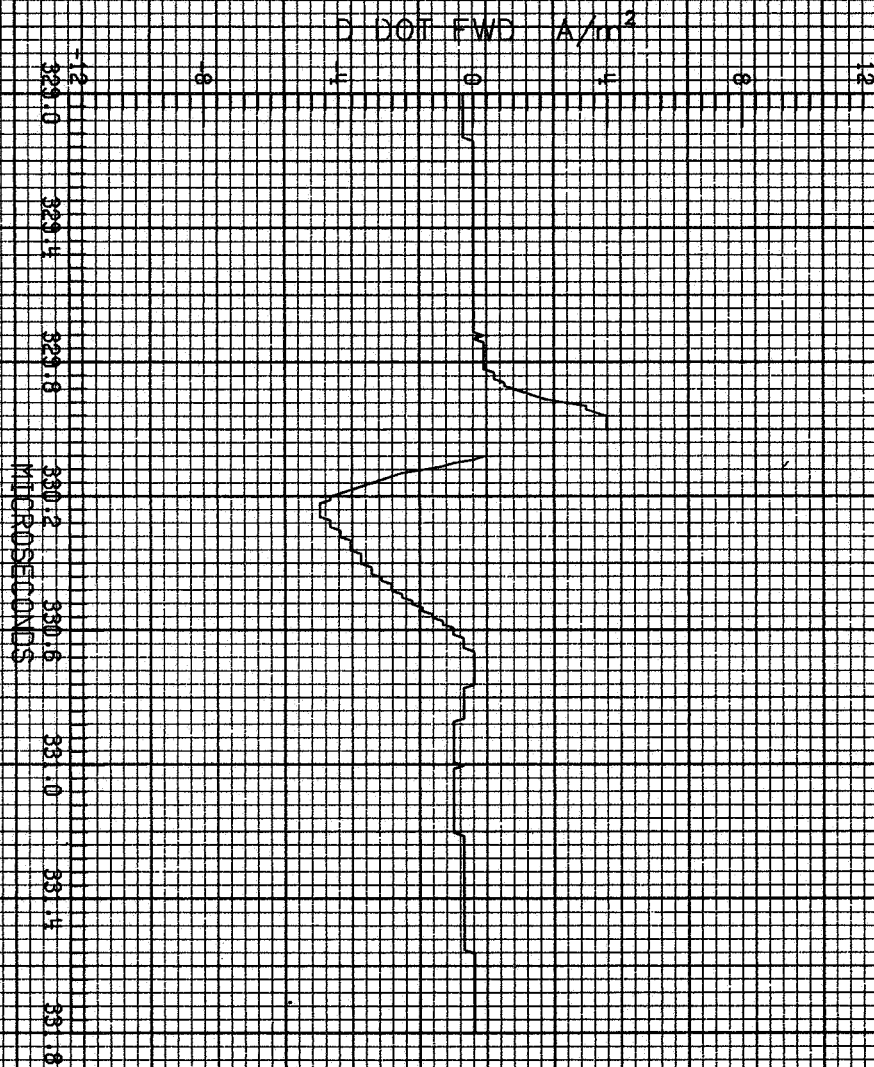


4
8
3
9
1
6
5
2
7
0

F106 LIGHTNING/TK10/PCM/M. THOMAS

TEST NO. 82-026

RUN NO. 5

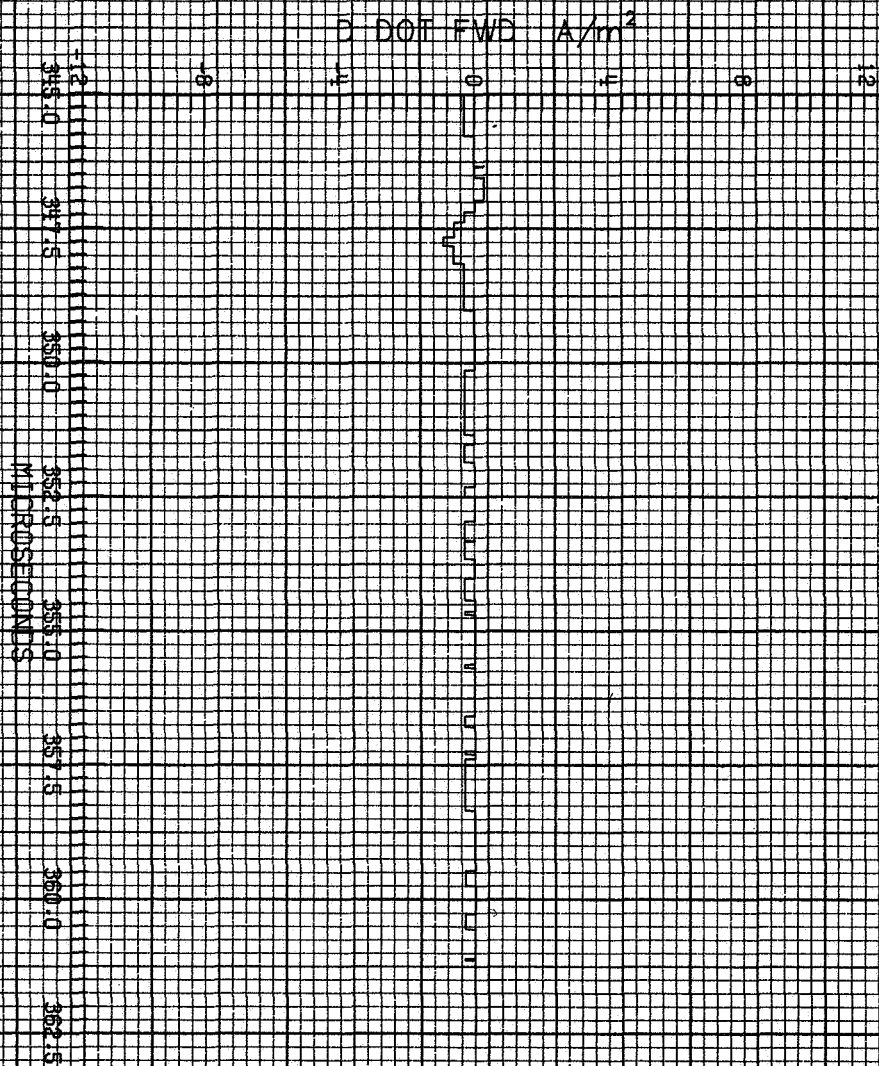


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F106 LIGHTNING/TK10/PCM/M. THOMAS

TEST NO. 82-028

RUN NO. 5

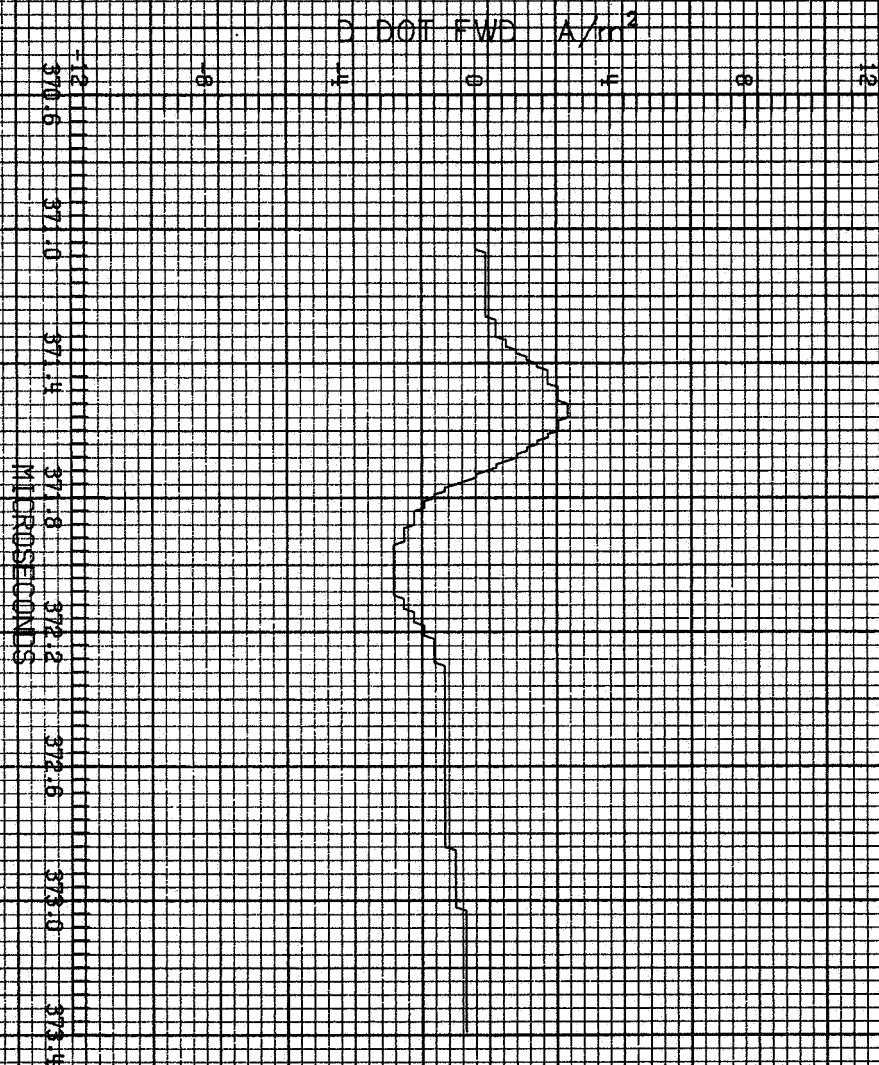


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F106 LIGHTNING/TK10/PCM/M. THOMAS

TEST NO. 82-028

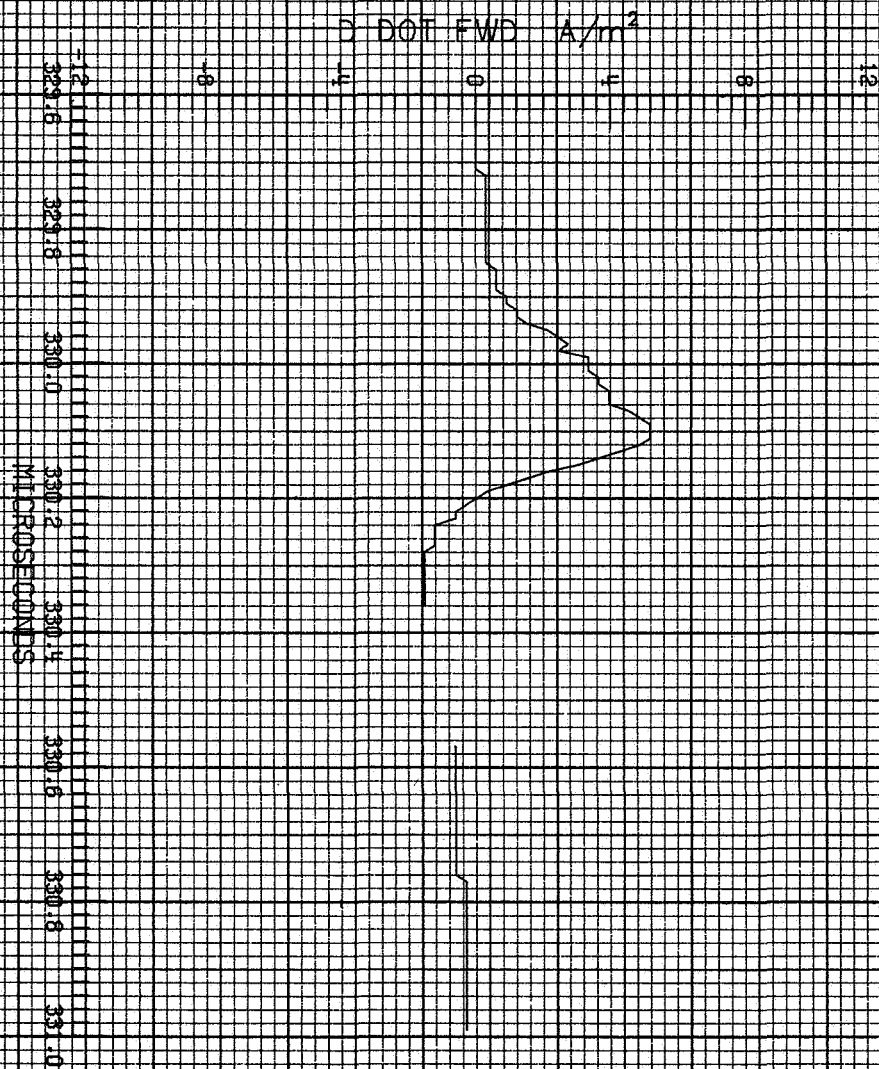
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F106 LIGHTNING/TK10/PCM/M.THOMAS

TEST NO. 82-028

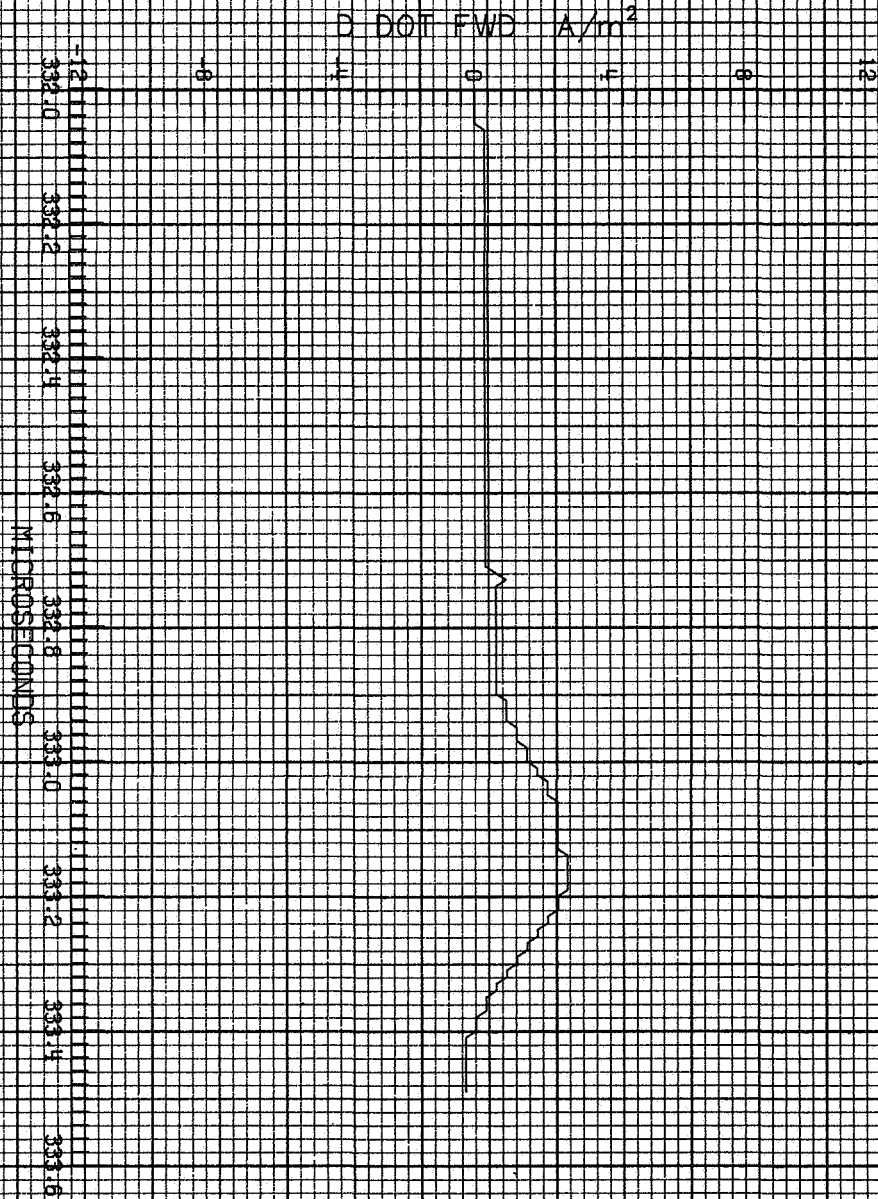
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F106 LIGHTNING/TK10/PCM/M. THOMAS

TEST NO. 82-028

RUN NO. 6

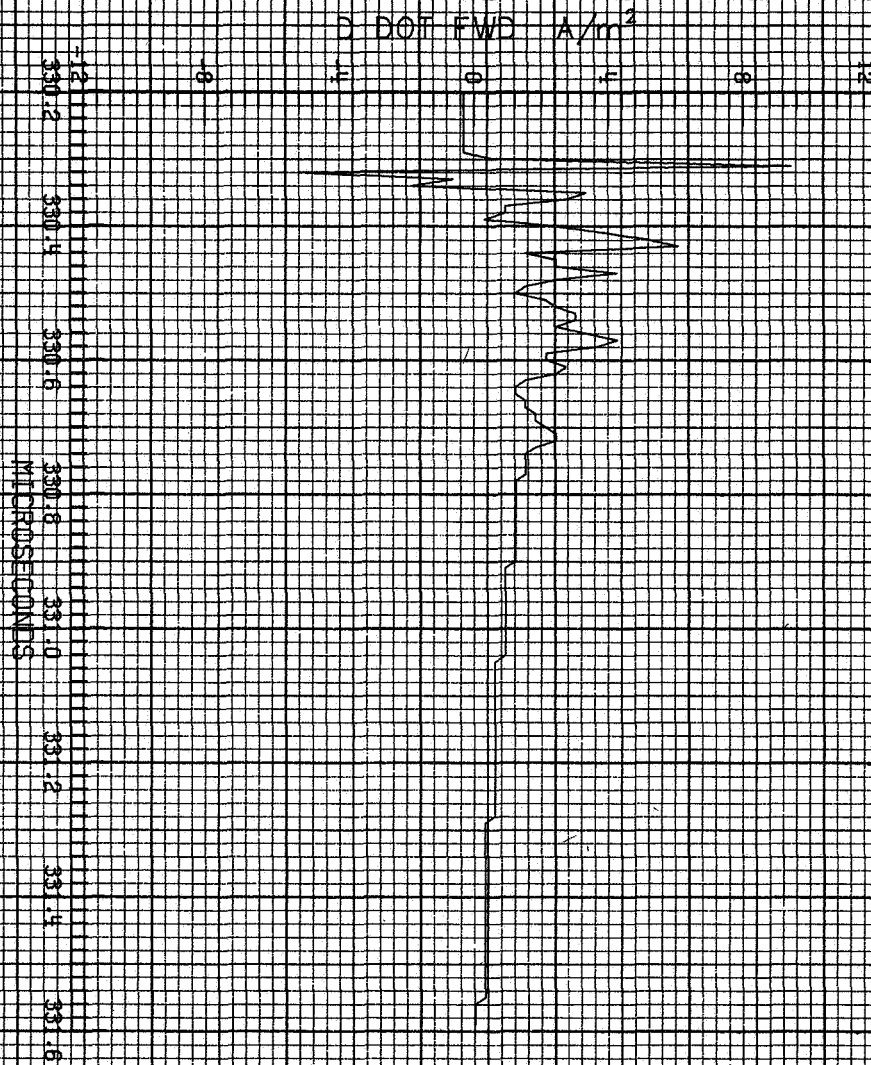


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106 LIGHTNING/TK10/PCM/M.THOMAS

TEST NO. 82-028

RUN NO. 7

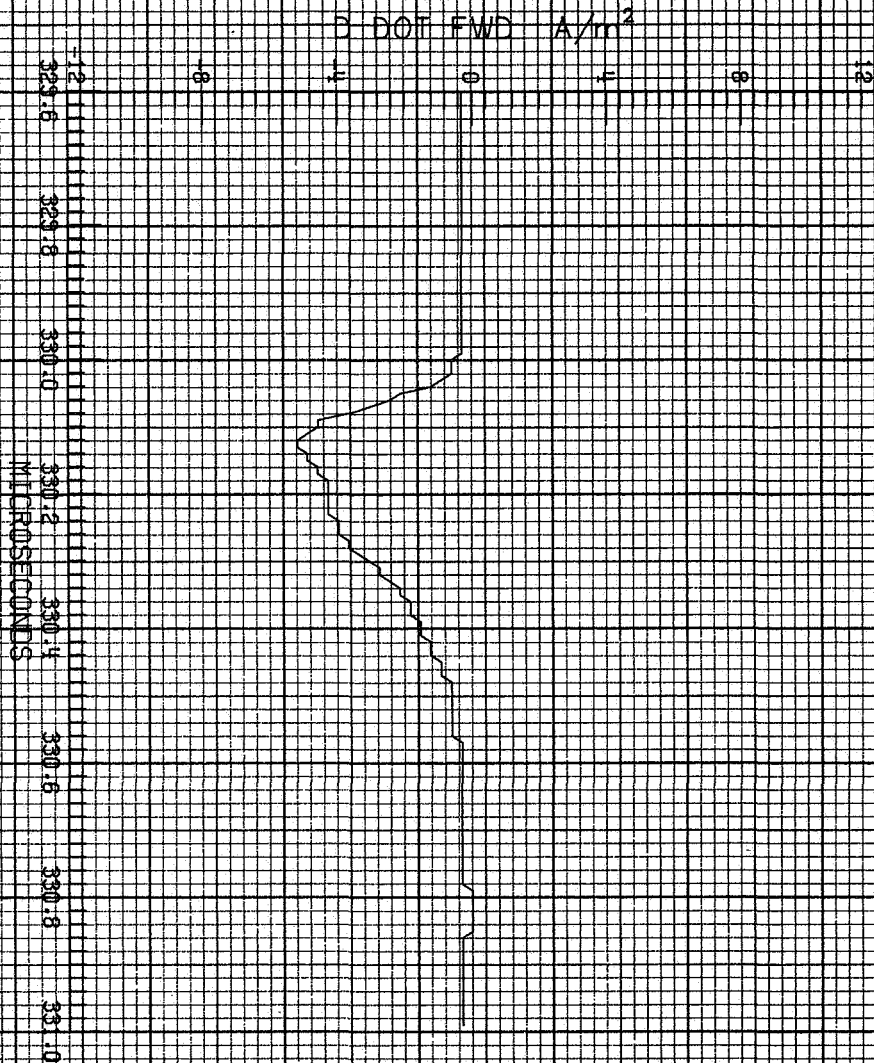


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F106 LIGHTNING/TK10/PCM/M. THOMAS

TEST NO. 82-028

RUN NO. 8



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F106 LIGHTNING/TK10/PCM/Y. THOMAS

TEST NO. 82-026

RUN NO. 8

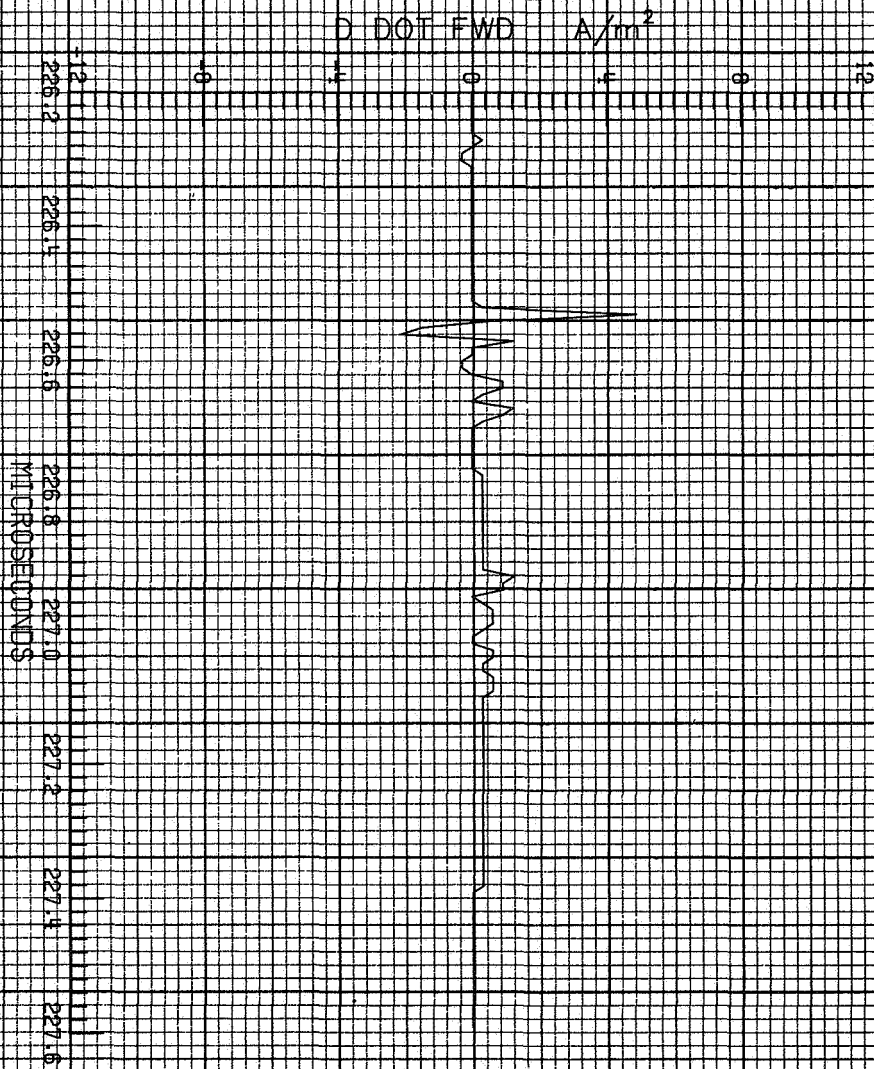


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F106 LIGHTNING/TK.10/M.THOMAS

TEST NO. 82-029

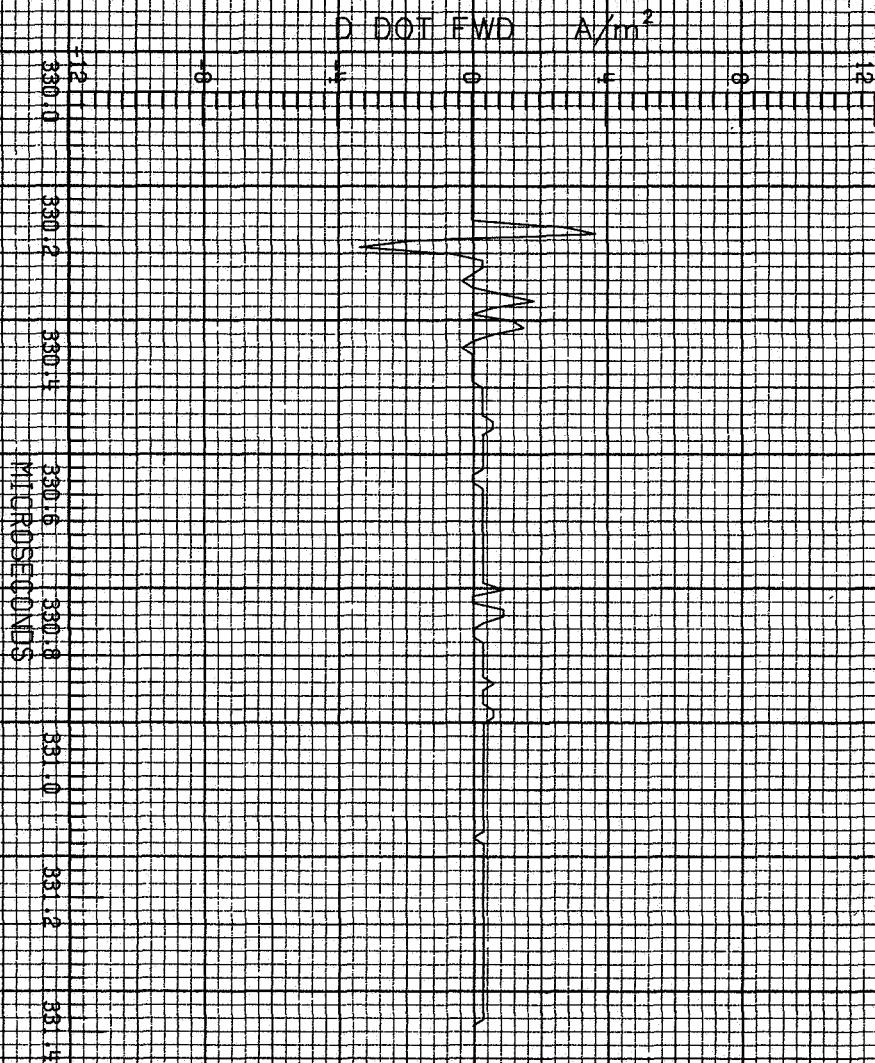
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F106 LIGHTNING/TK.10/M.THOMAS

TEST NO. 82-029

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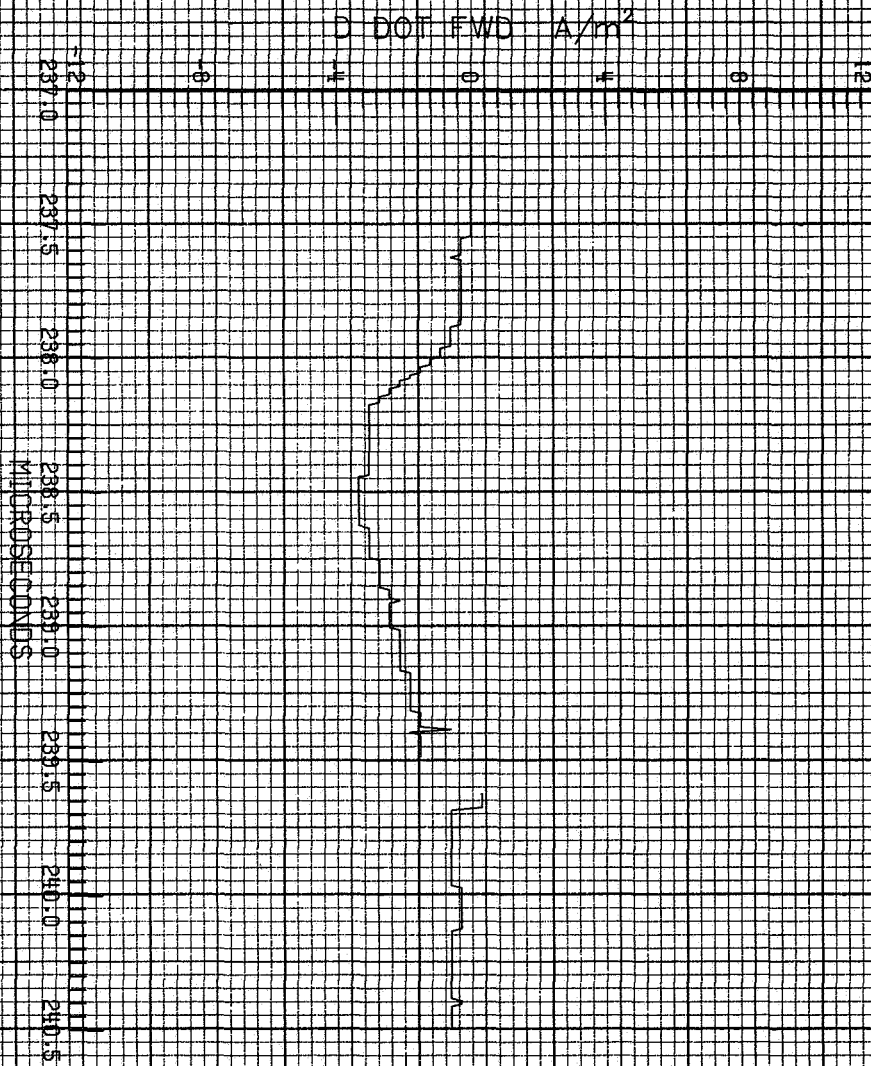


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F106 LIGHTNING/TK.10/M.THOMAS

TEST NO. 82-030

RUN NO. 1

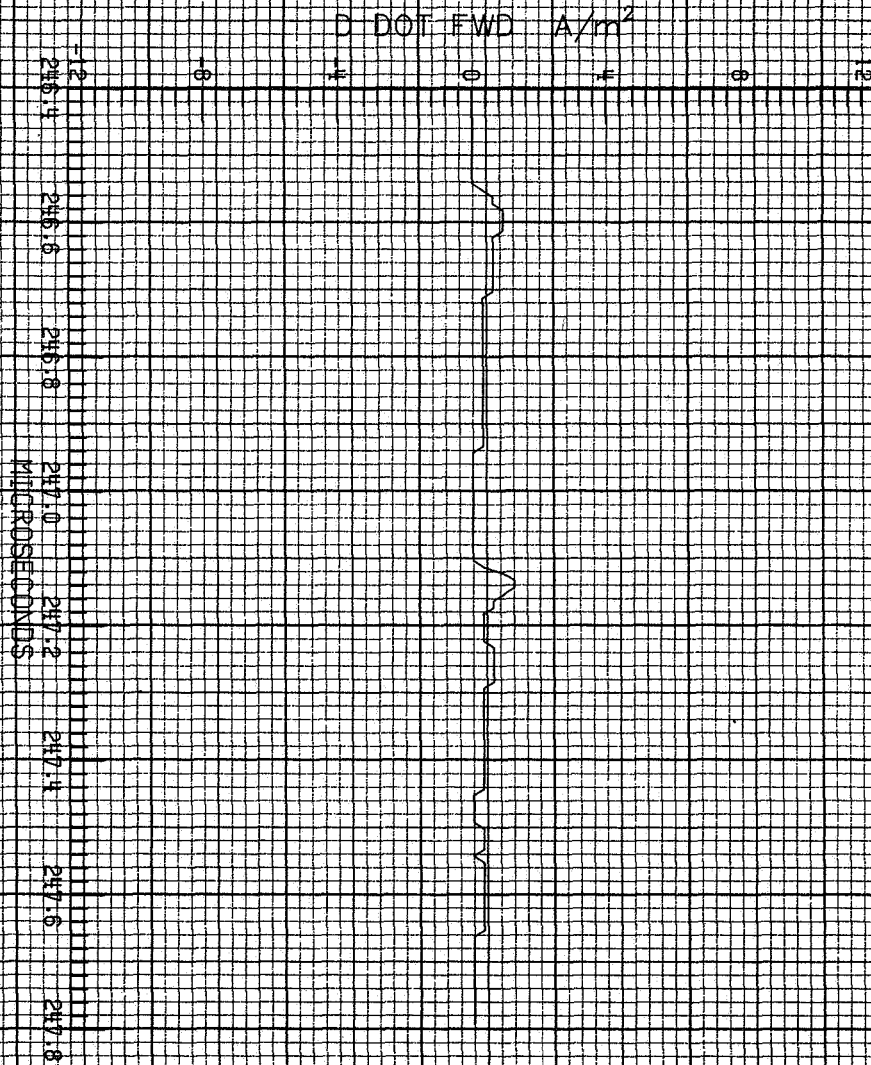


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F106 LIGHTNING/TK.10/M.THOMAS

TEST NO. 82-030

RUN NO. 1

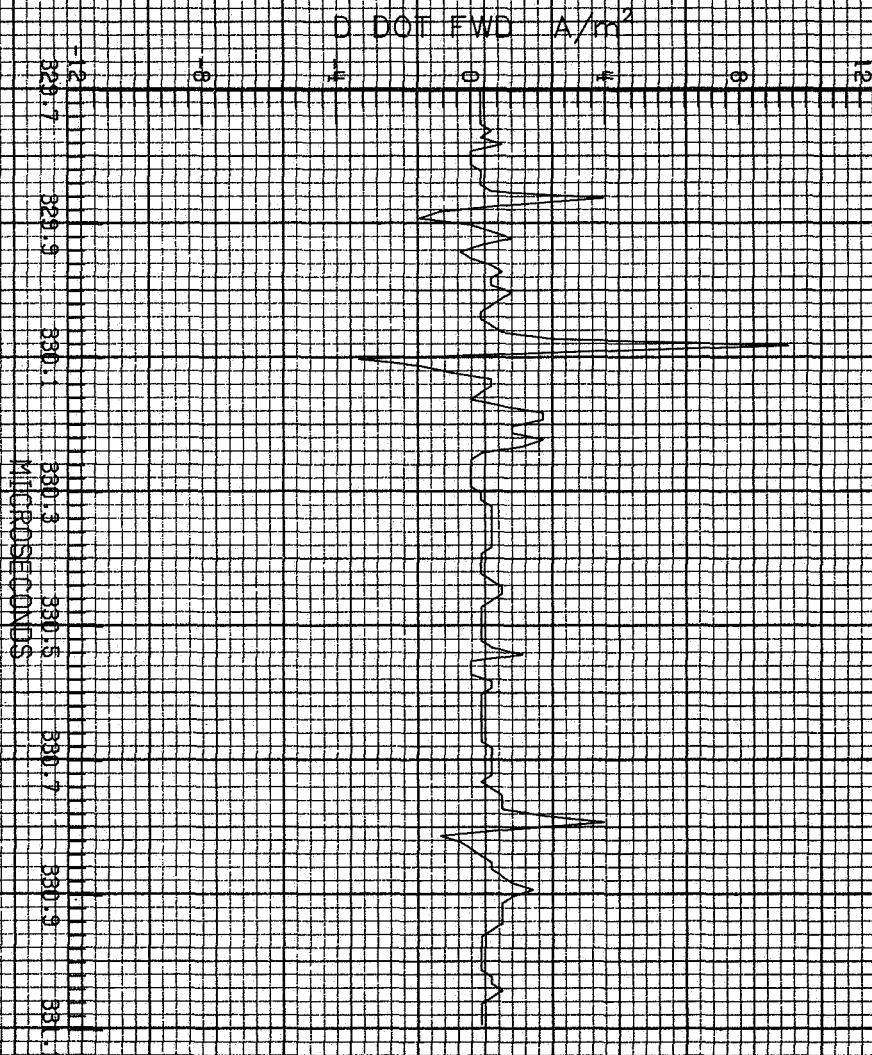


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TEST NO. 82-030

RUN NO. 2

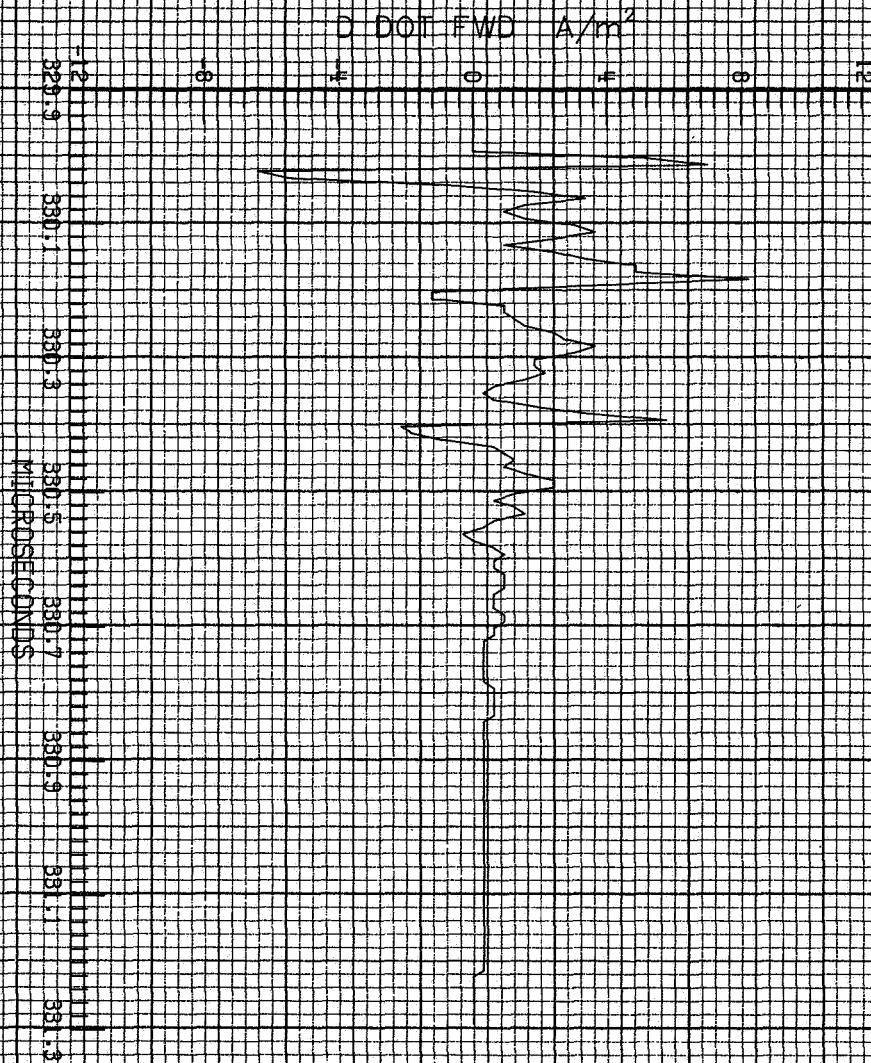


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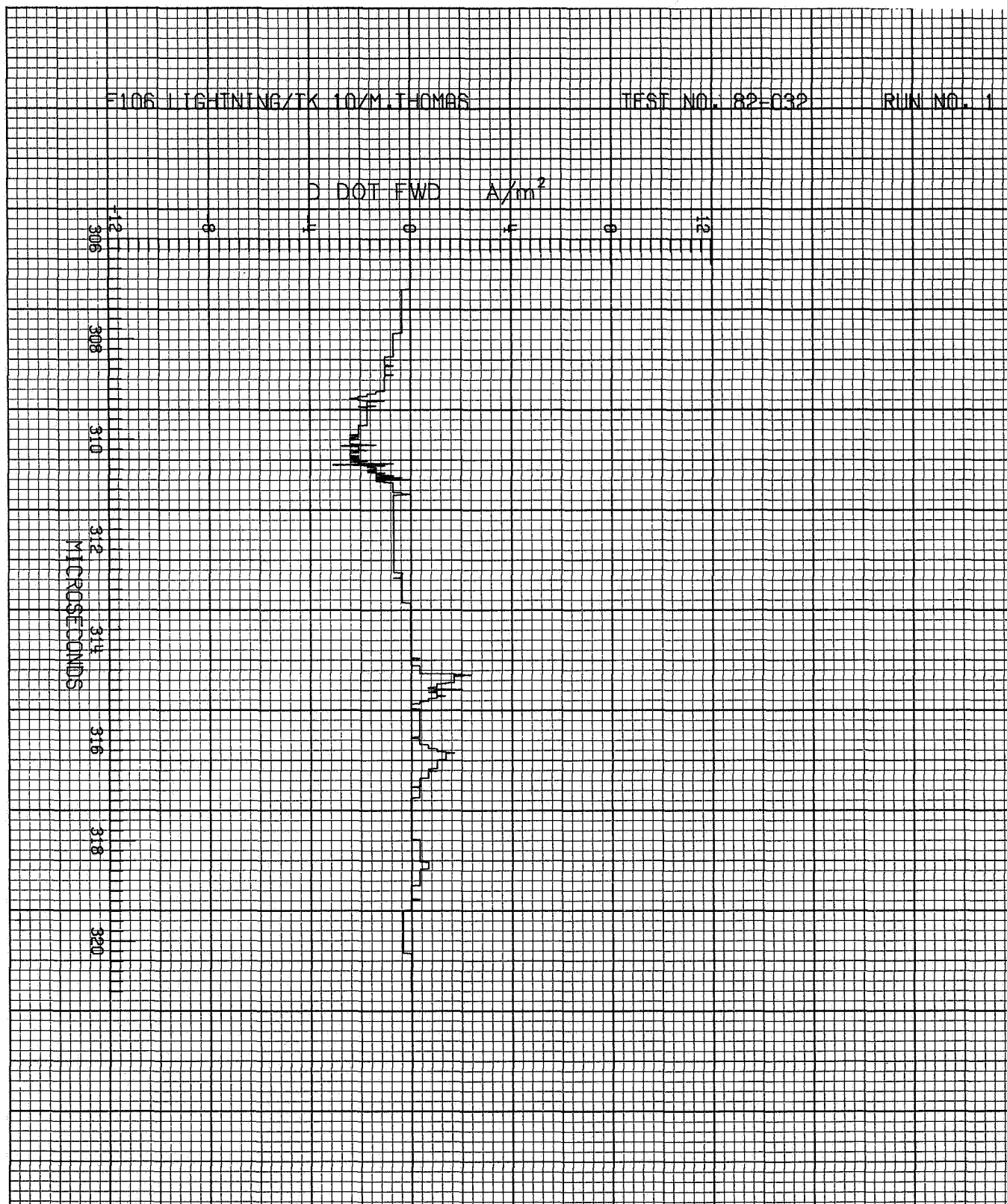
F106 LIGHTNING/TK.10/M.THOMAS

TEST NO. 82-030

RUN NO. 3



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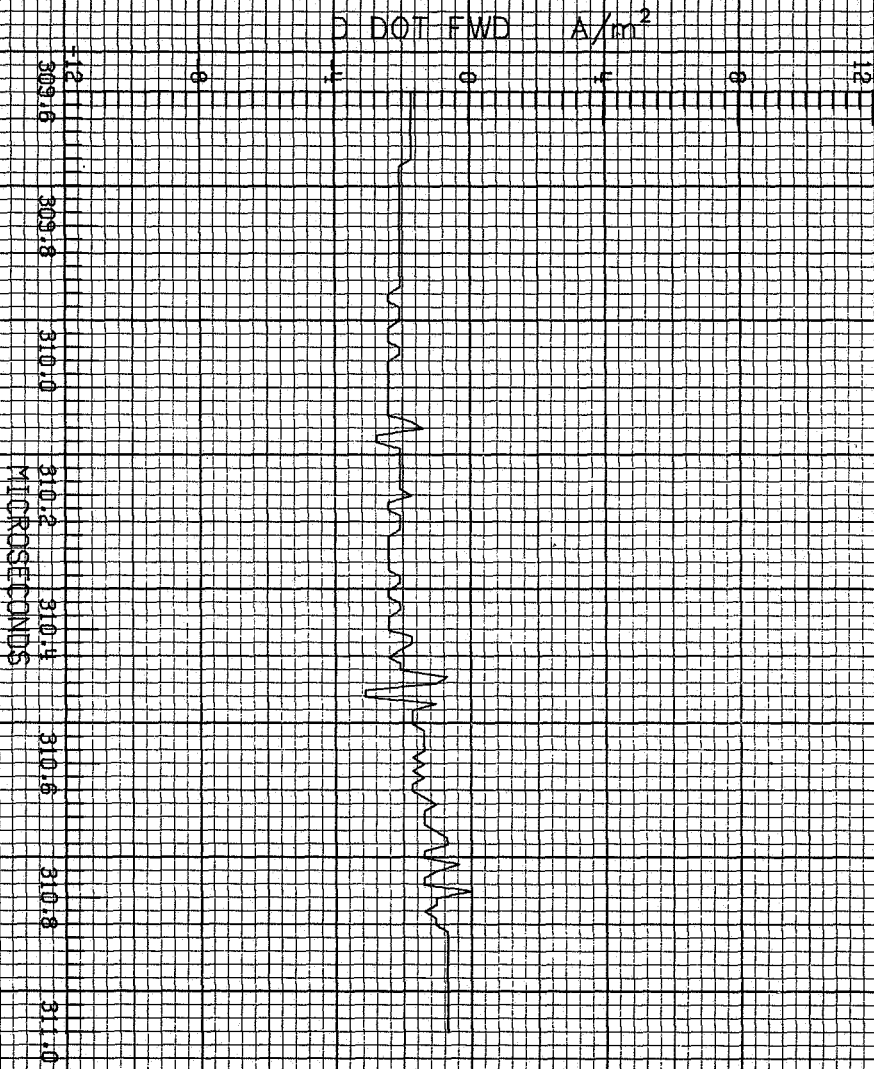


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F106 LIGHTNING/TK 10/M. THOMAS

TEST NO. 82-032

RUN NO. 1

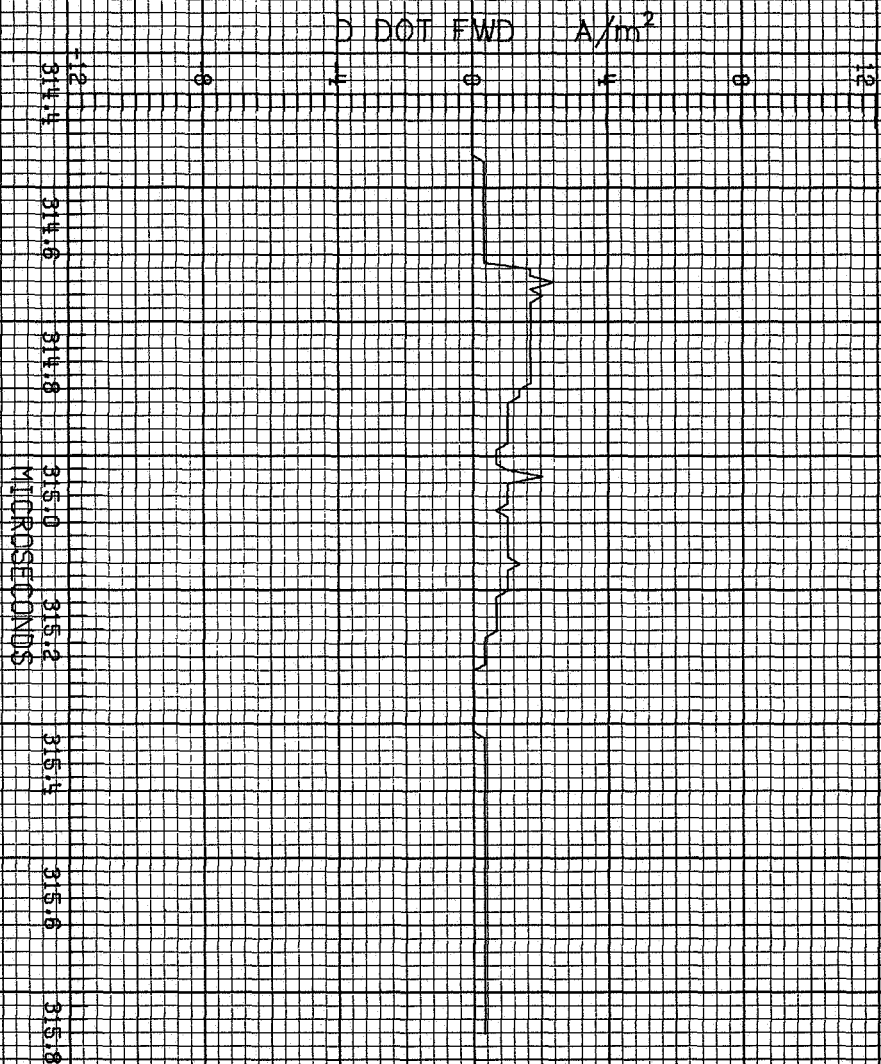


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F106 LIGHTNING/TK 10/M. THOMAS

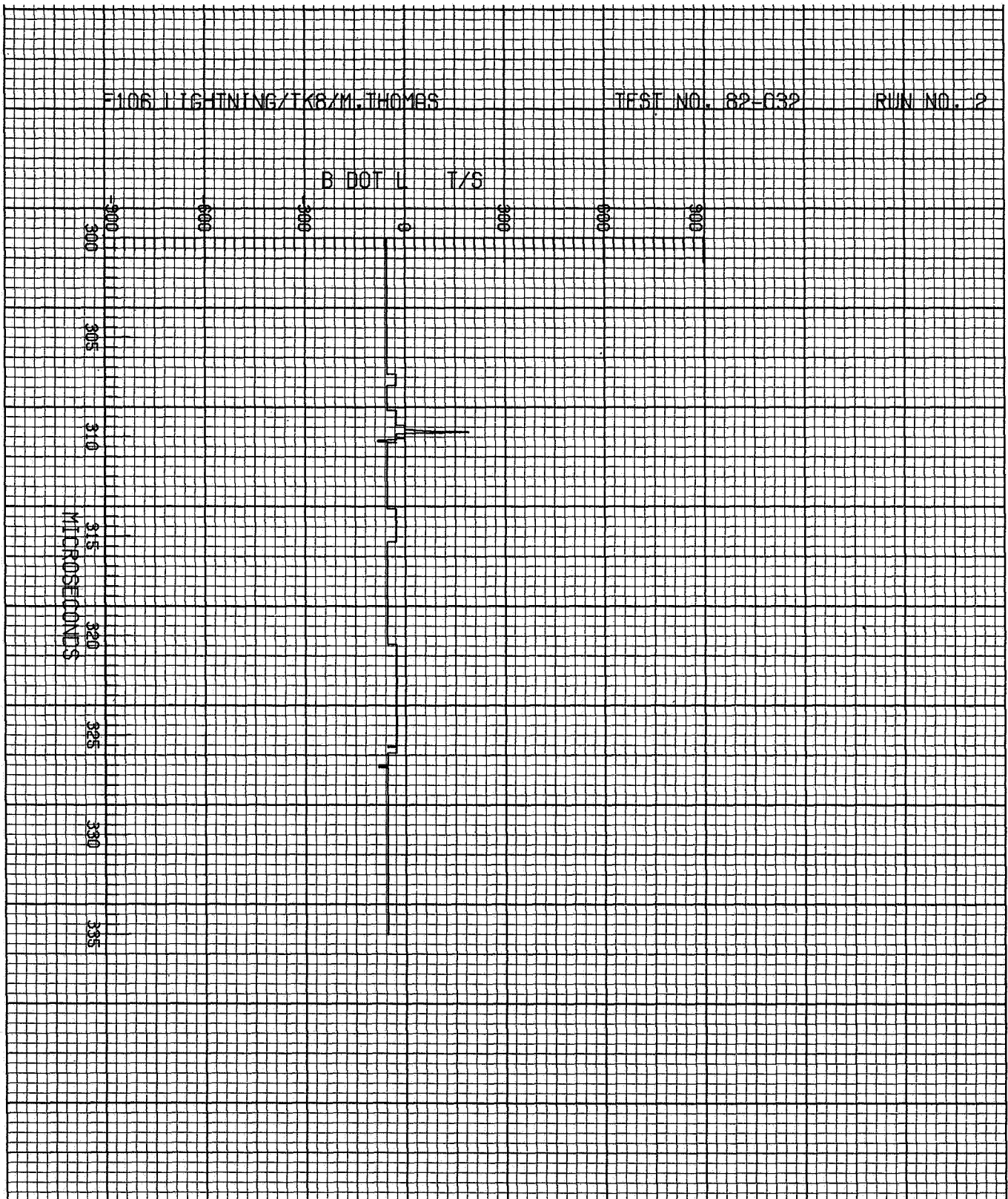
TEST NO. 82-032

RUN NO. 1



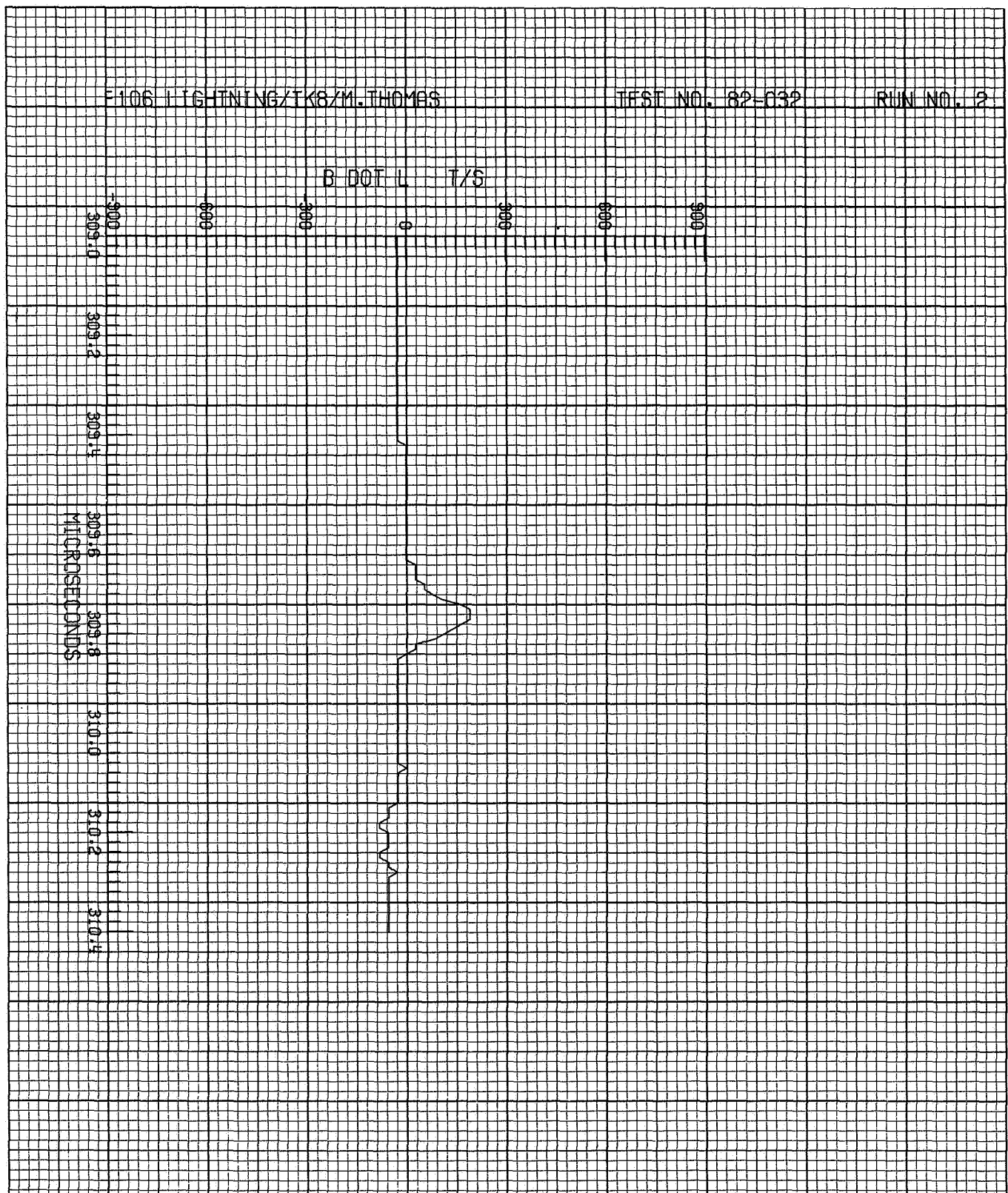
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C-4

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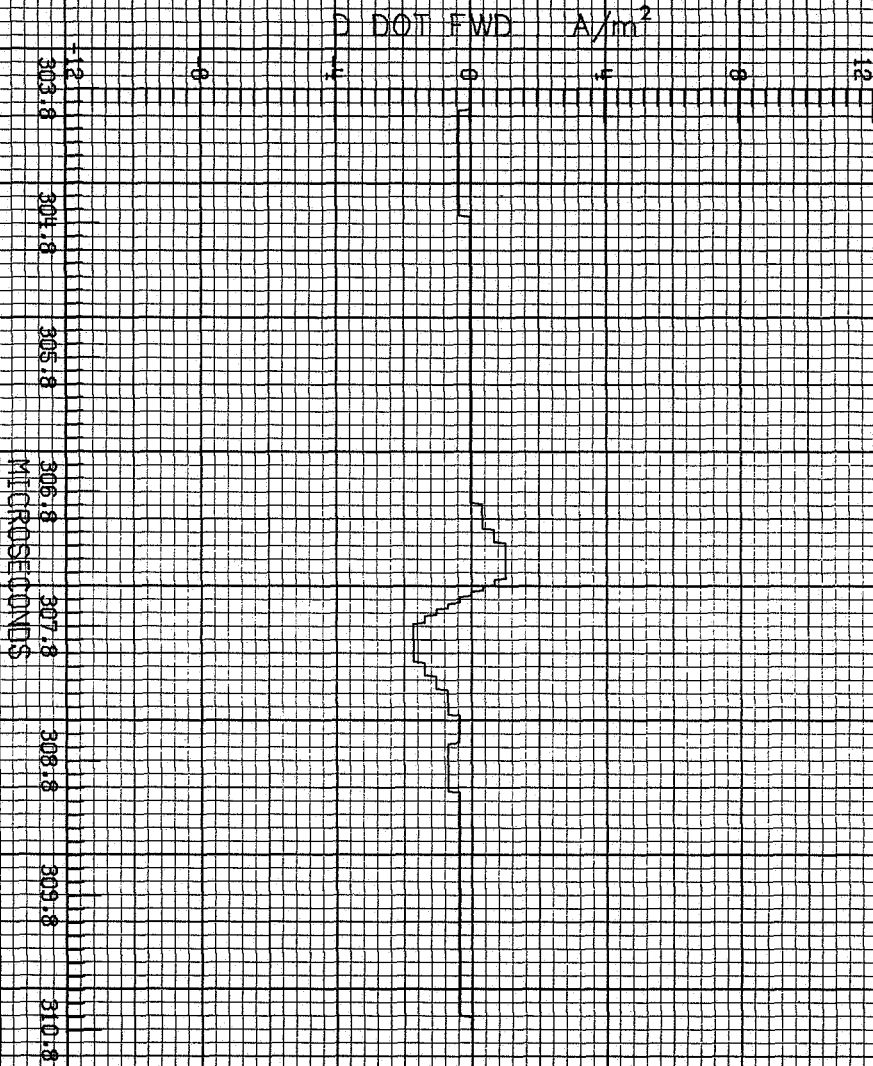


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F106 LIGHTNING/TK 10/M.THOMAS

TEST NO. 82-032

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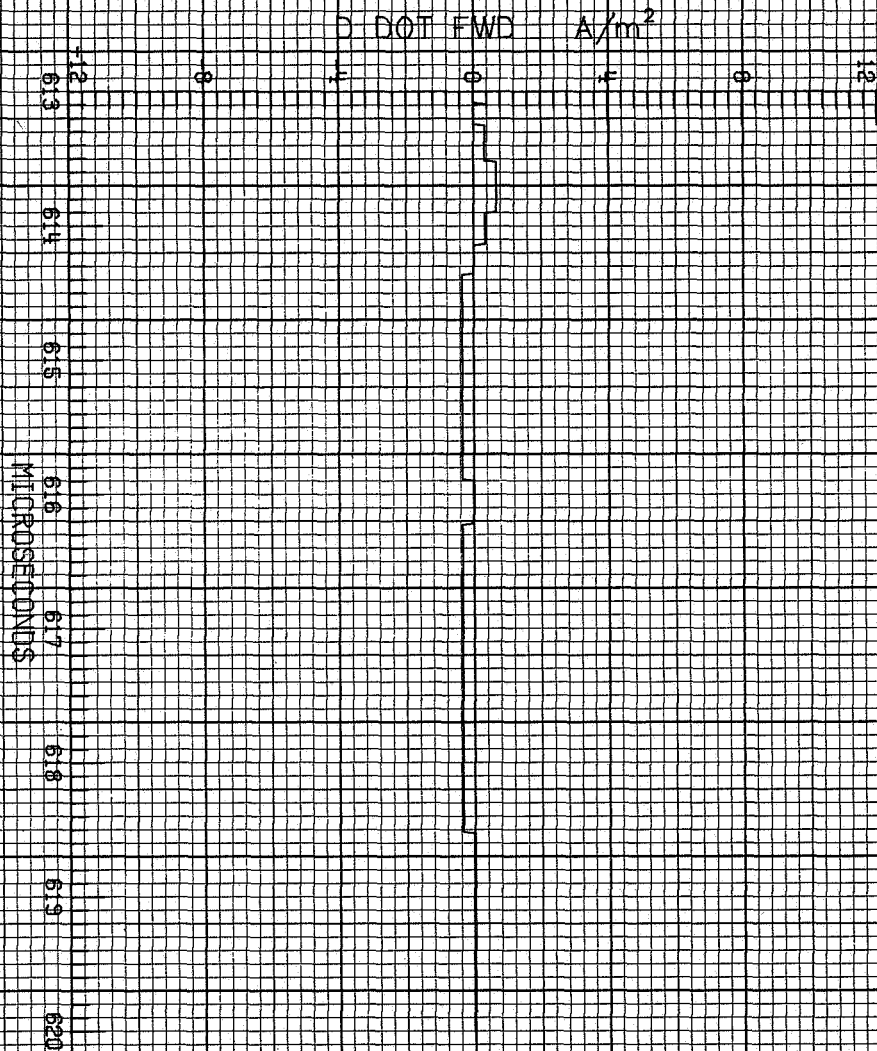


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F106 LIGHTNING/TK 10/M. THOMAS

TEST NO. 82-032

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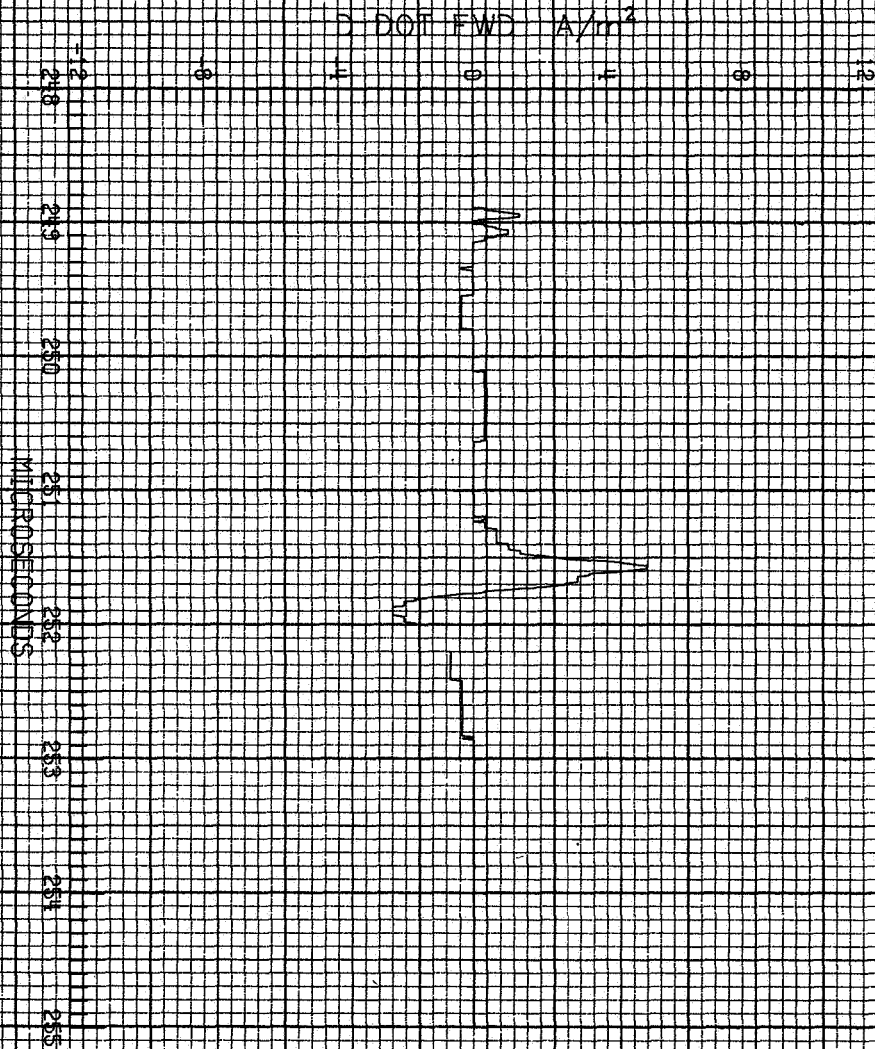


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F106 LIGHTNING/TK.10/M.T.HOMAS

TEST NO. 82-034

RUN NO. 1



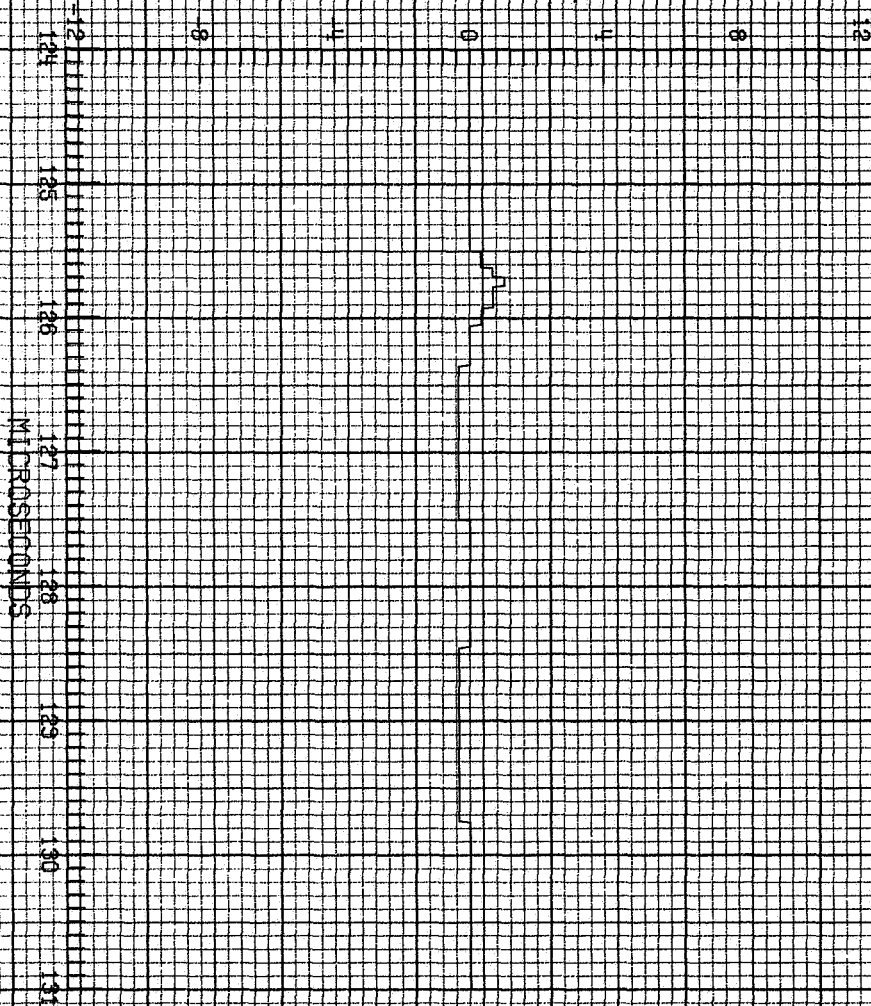
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F106 LIGHTNING/TK-10/M. THOMAS

TEST NO. 82-034

RUN NO. 2

D. DOT FWD A/m^2

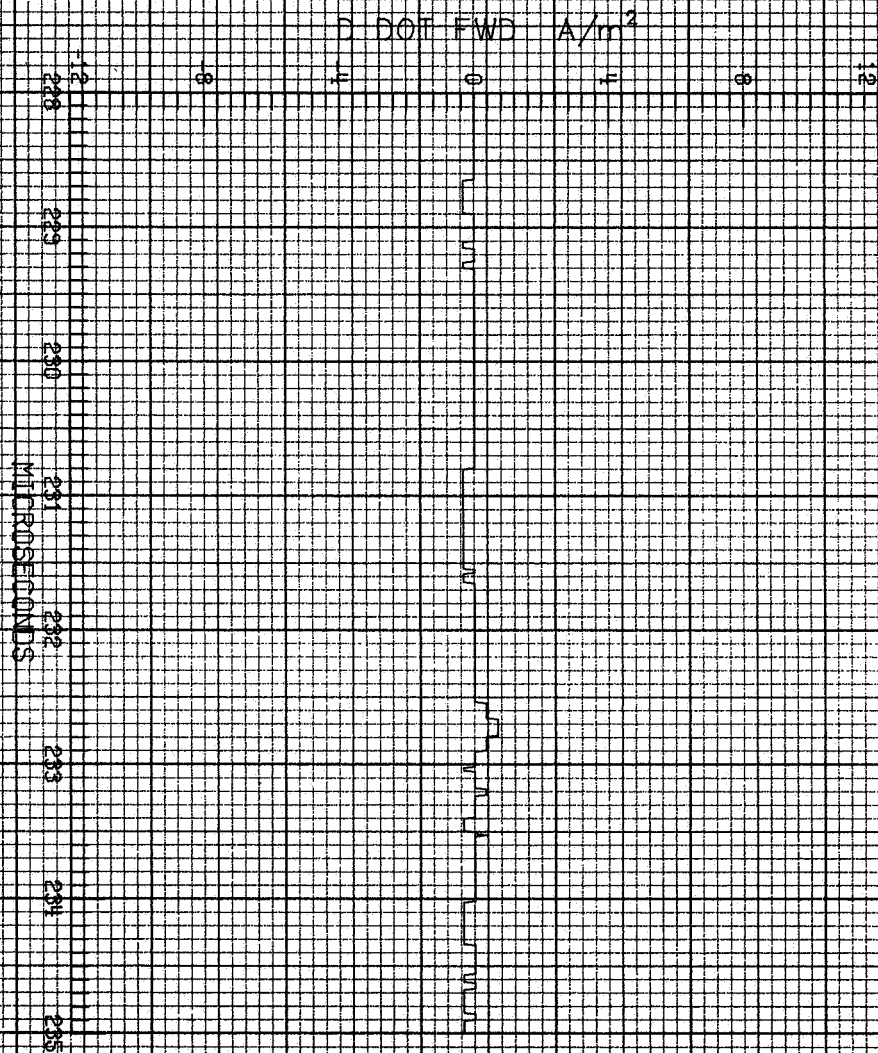


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F106 LIGHTNING/TK.10/M.THOMAS

TEST NO. 82-034

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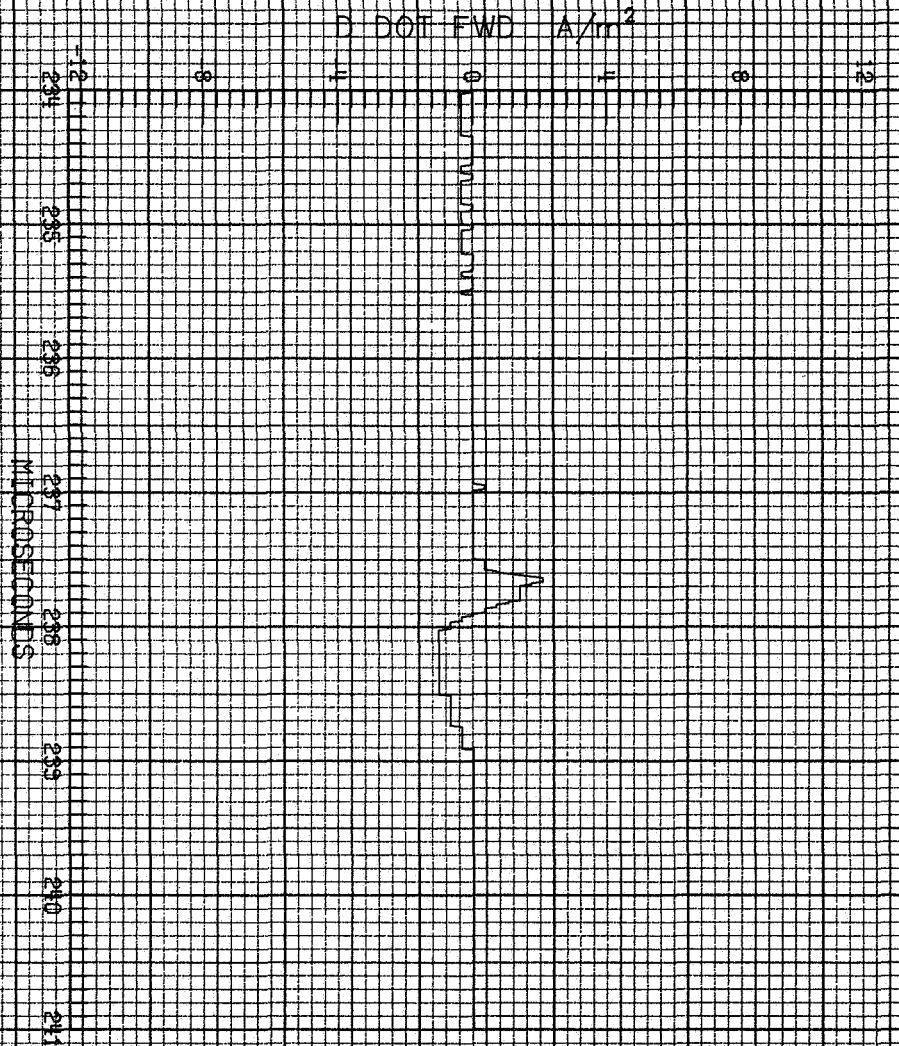


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TEST NO. 82-034

RUN NO. 2

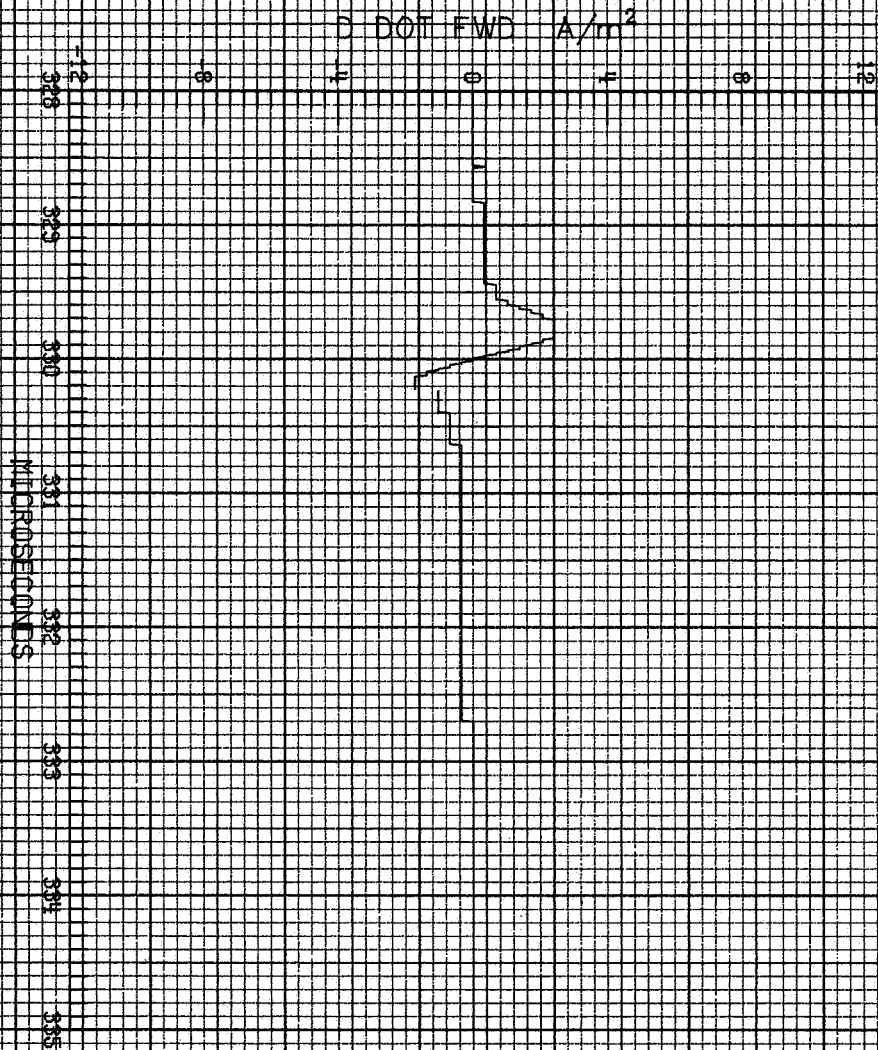


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TEST NO. 82-034

RUN NO. 2

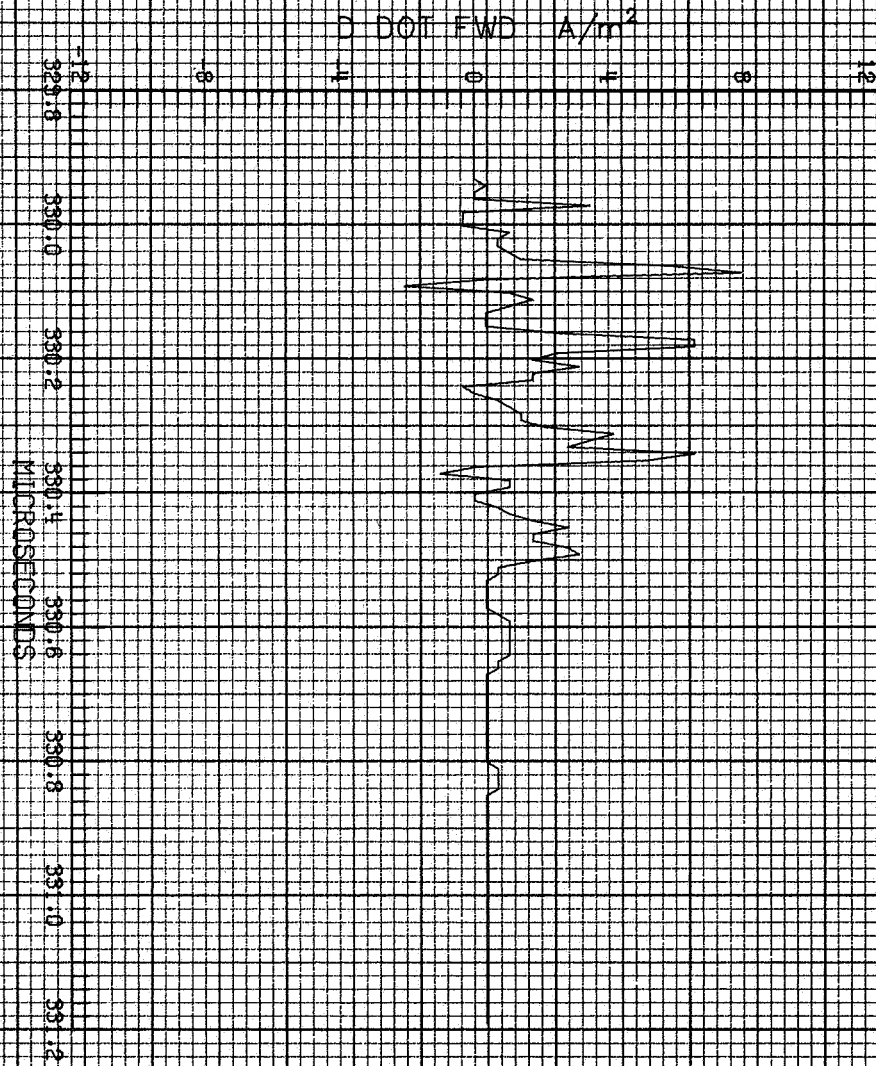


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F106 LIGHTNING/TK.10/M.T.HOMBS

TEST NO. 82-634

RUN NO. 3

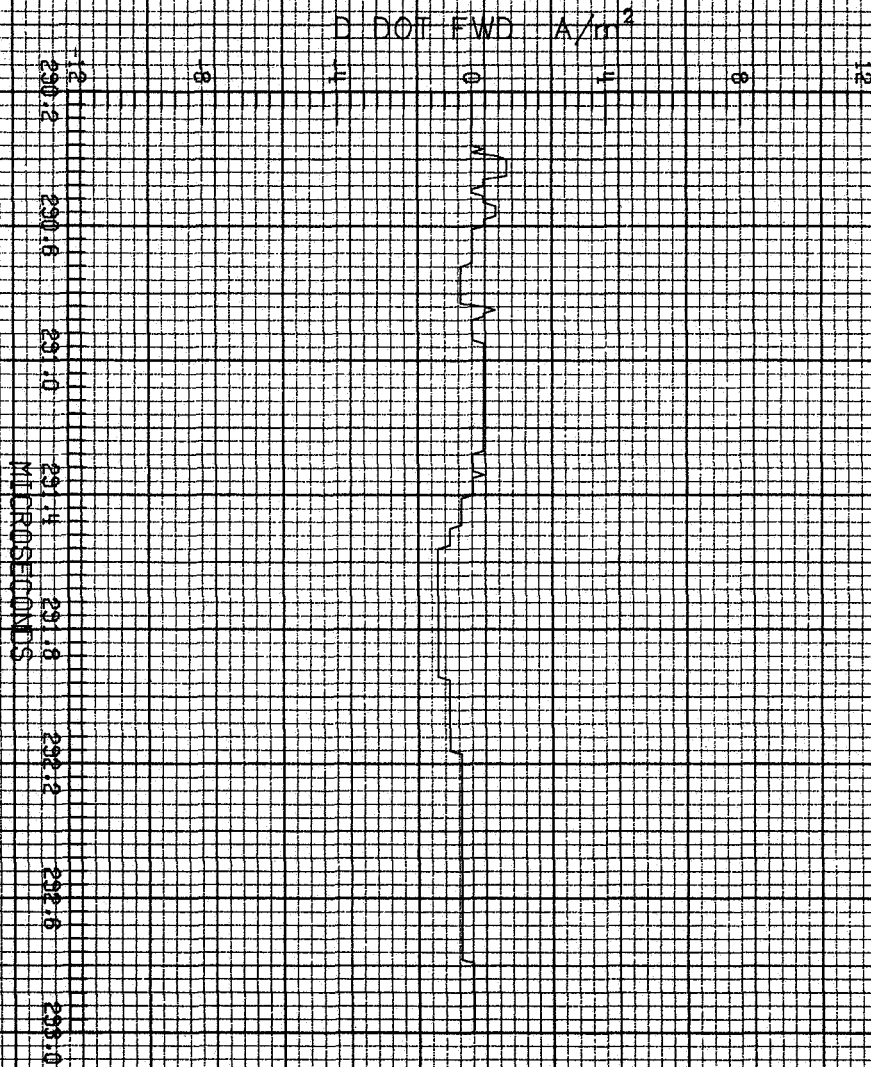


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F106 LIGHTNING/TK-10/M. THOMAS

TEST NO. 82-034

RUN NO. 4

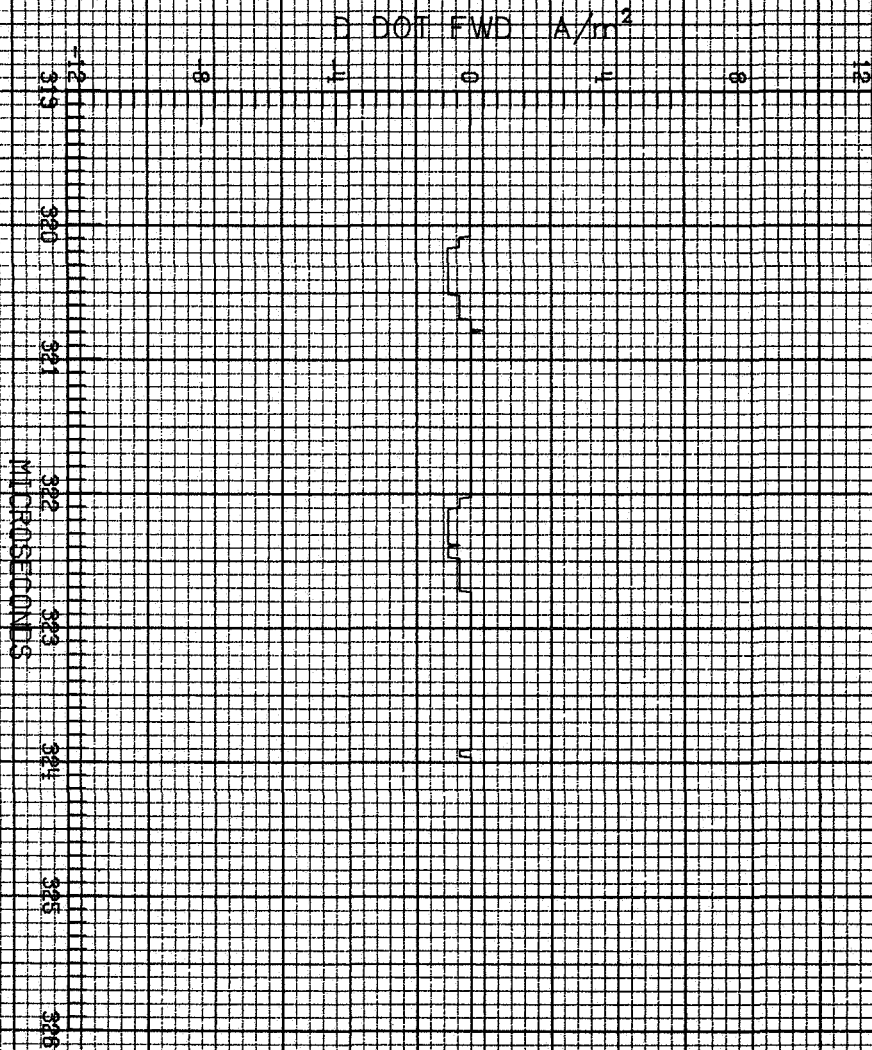


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TEST NO. 82-034

RUN NO. 4

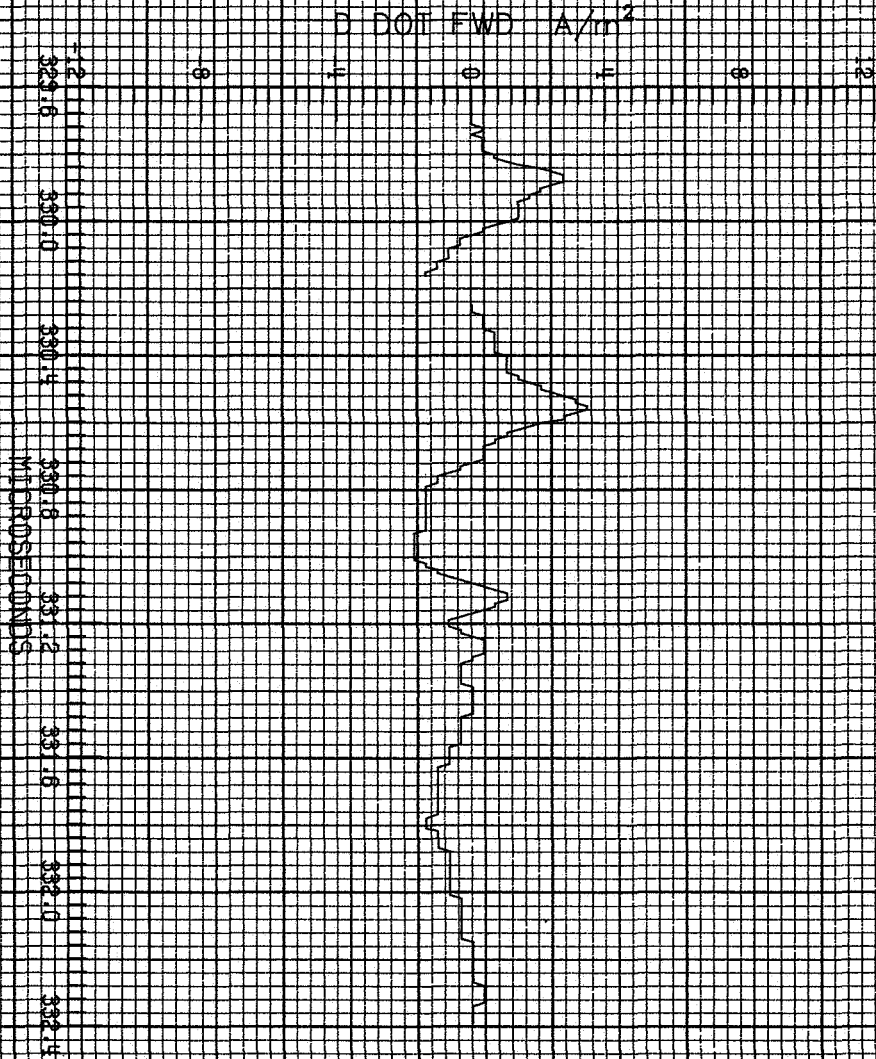


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TEST NO. 82-034

RUN NO. 4

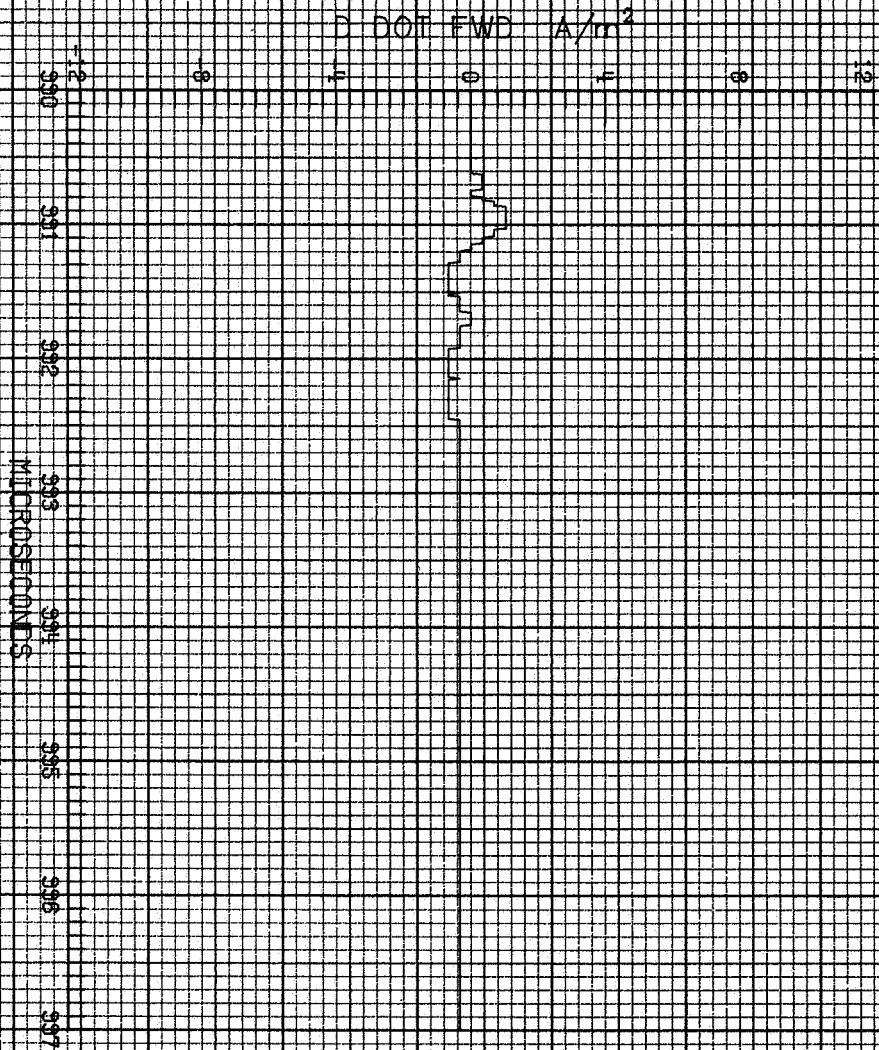


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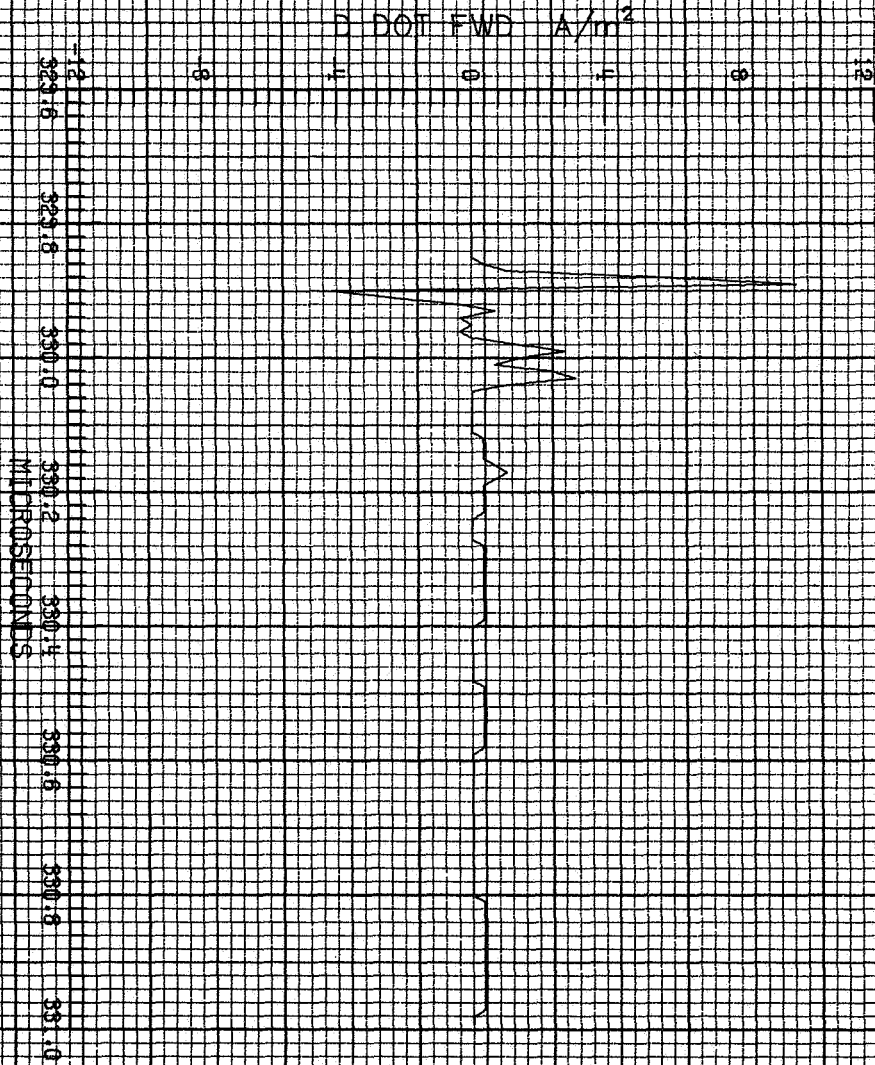
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F106 LIGHTNING/TK.10/M.THOMAS

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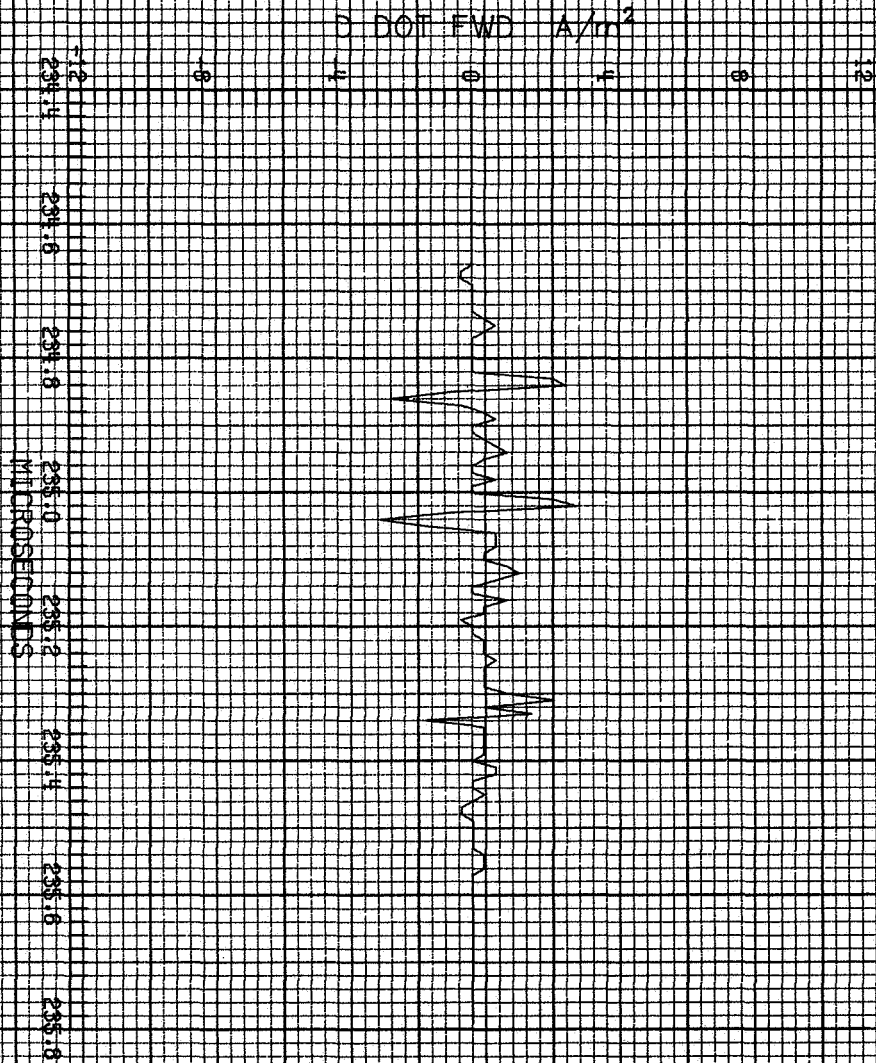
RUN NO. 5



F106 LIGHTNING/TK.10/M.THOMAS

TEST NO., 82-035

RUN NO., 1

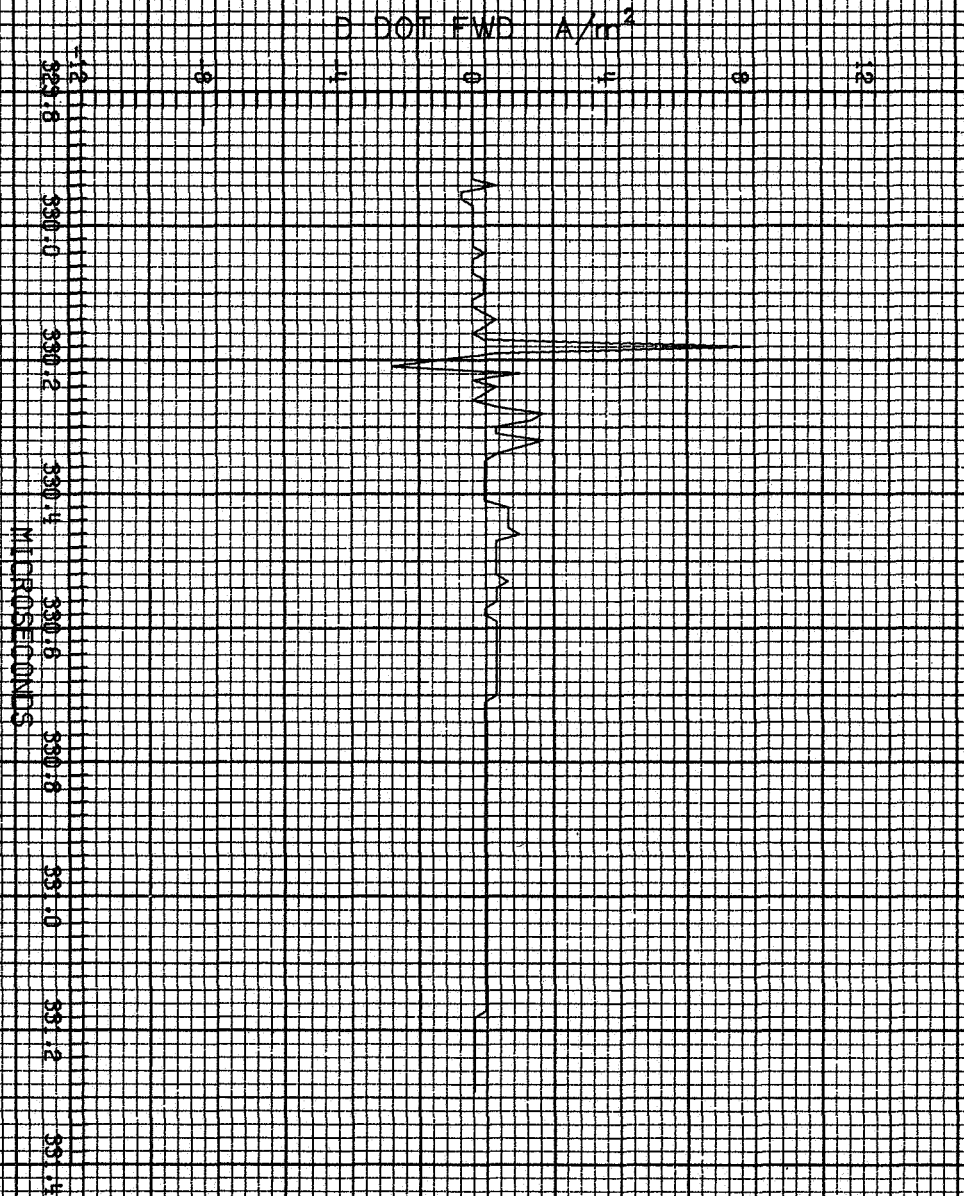


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F106 LIGHTNING/TK.10/M.THOMAS

TEST NO. 82-035

RUN NO. 2



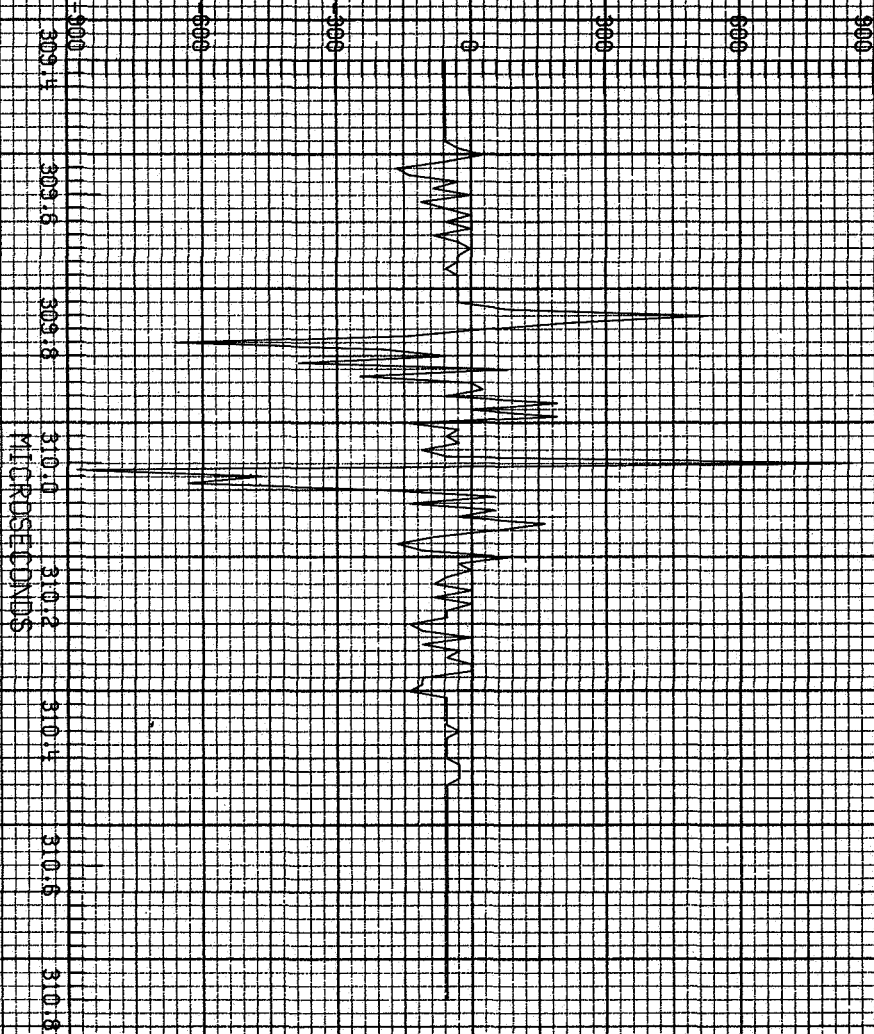
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F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-637

RUN NO. 1

B DOT L T/S

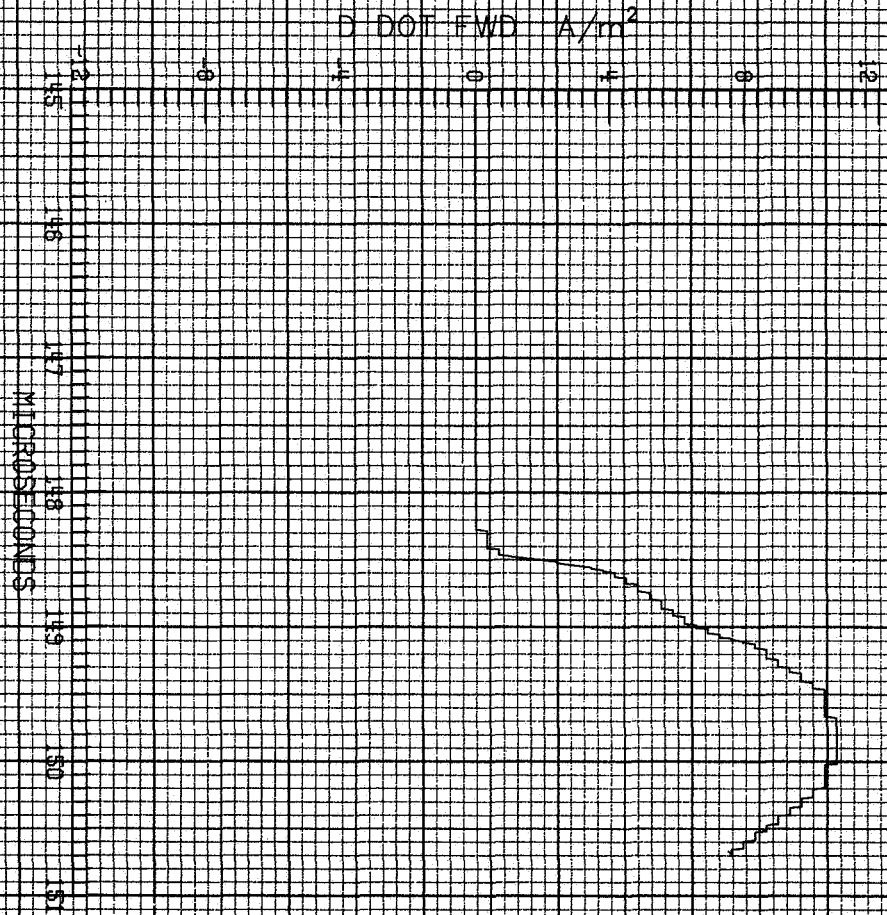


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F106 LIGHTNING/TK 10/THOMES

TEST NO. 82-637

RUN NO. 1



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F106 LIGHTNING/TK 10/THOMAS

TEST NO. 82-037

RUN NO. 1

D DOT FWD A/m²

$\frac{z}{d}$	303.0	304.5	306.0	307.5
MICROSECONDES				

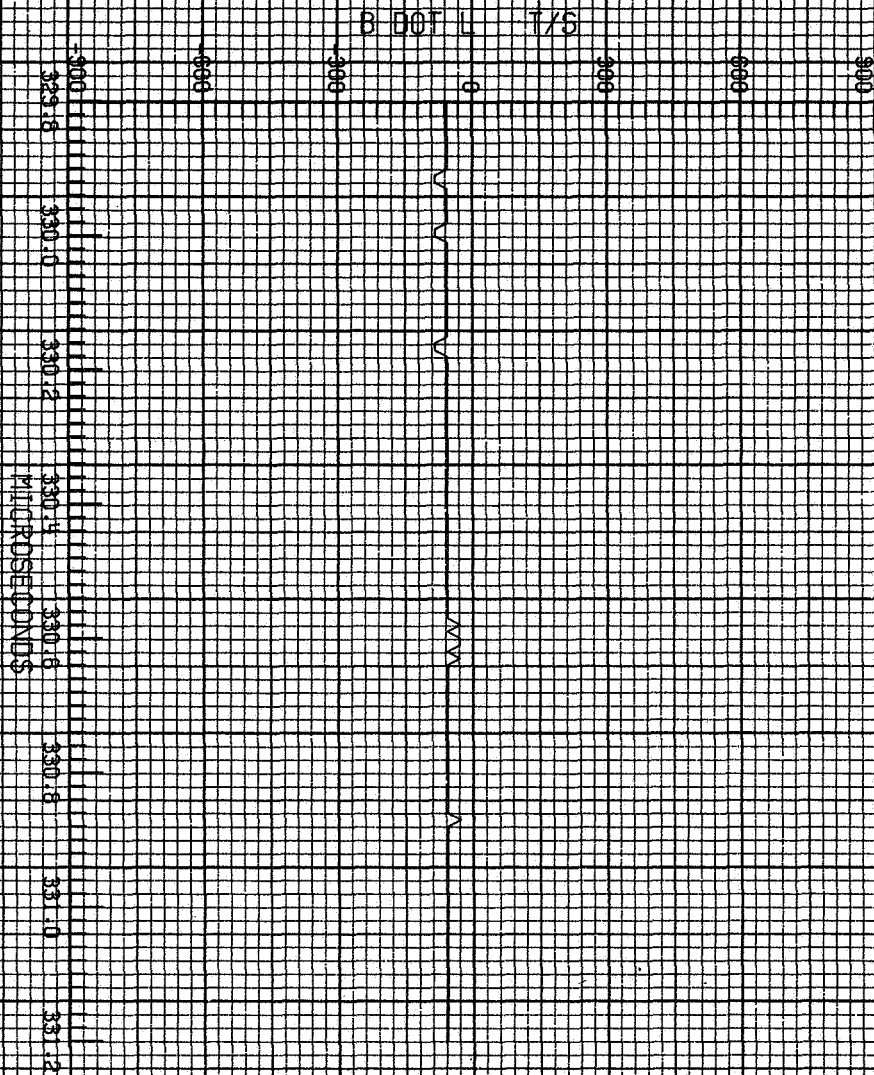


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F106 LIGHTNING/TK 8/THOMBS

TEST NO. 82-037

RUN NO. 2

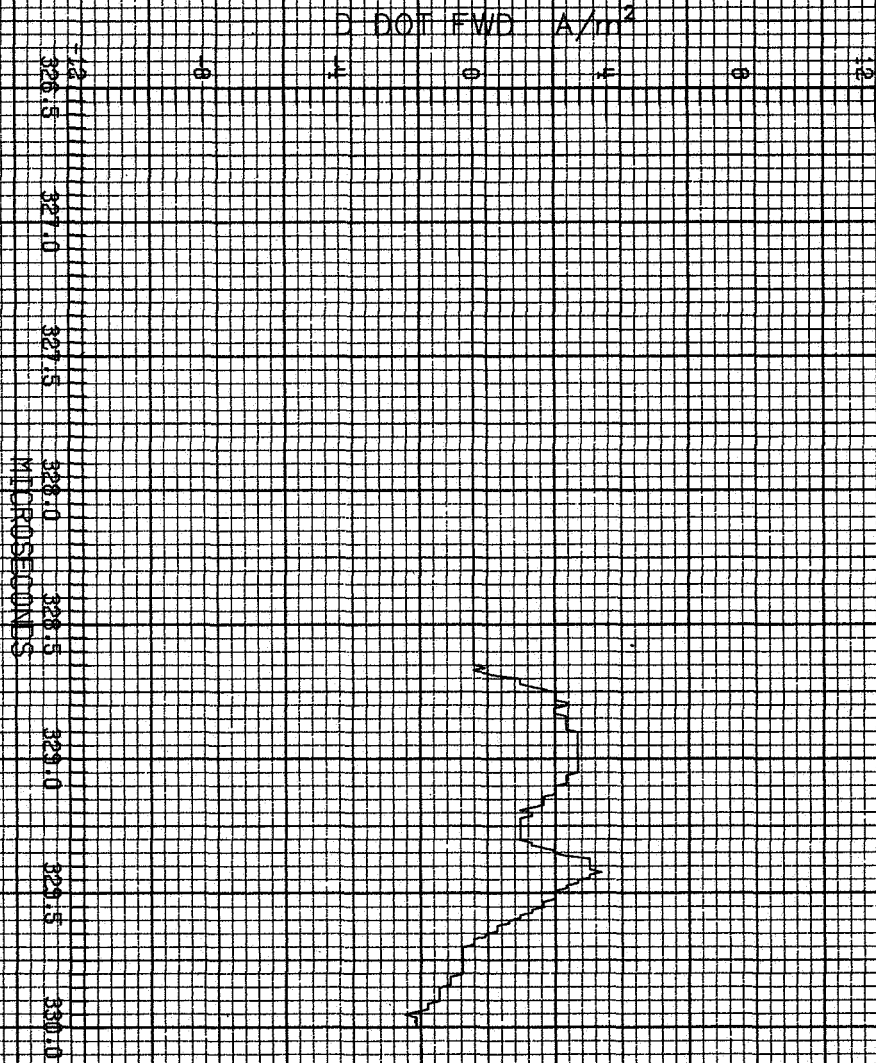


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F106 LIGHTNING/TK 10/THOMES

TEST NO. 82-637

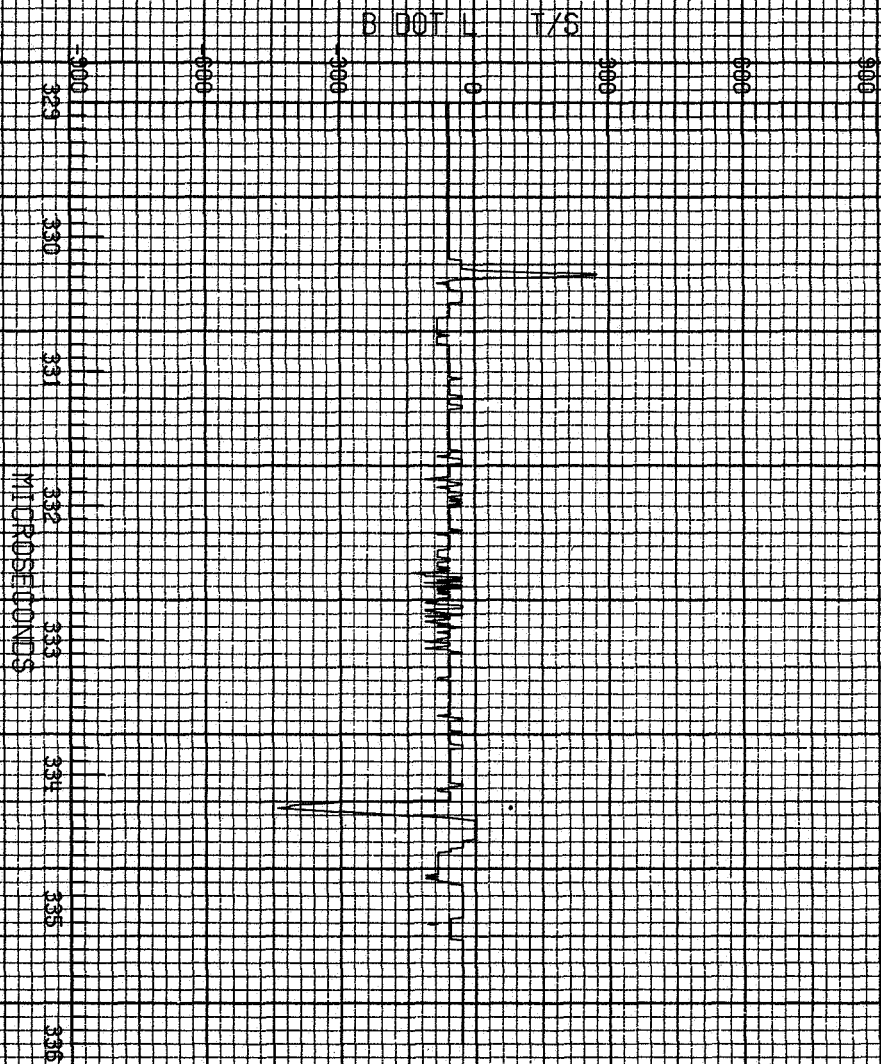
RUN NO. 2



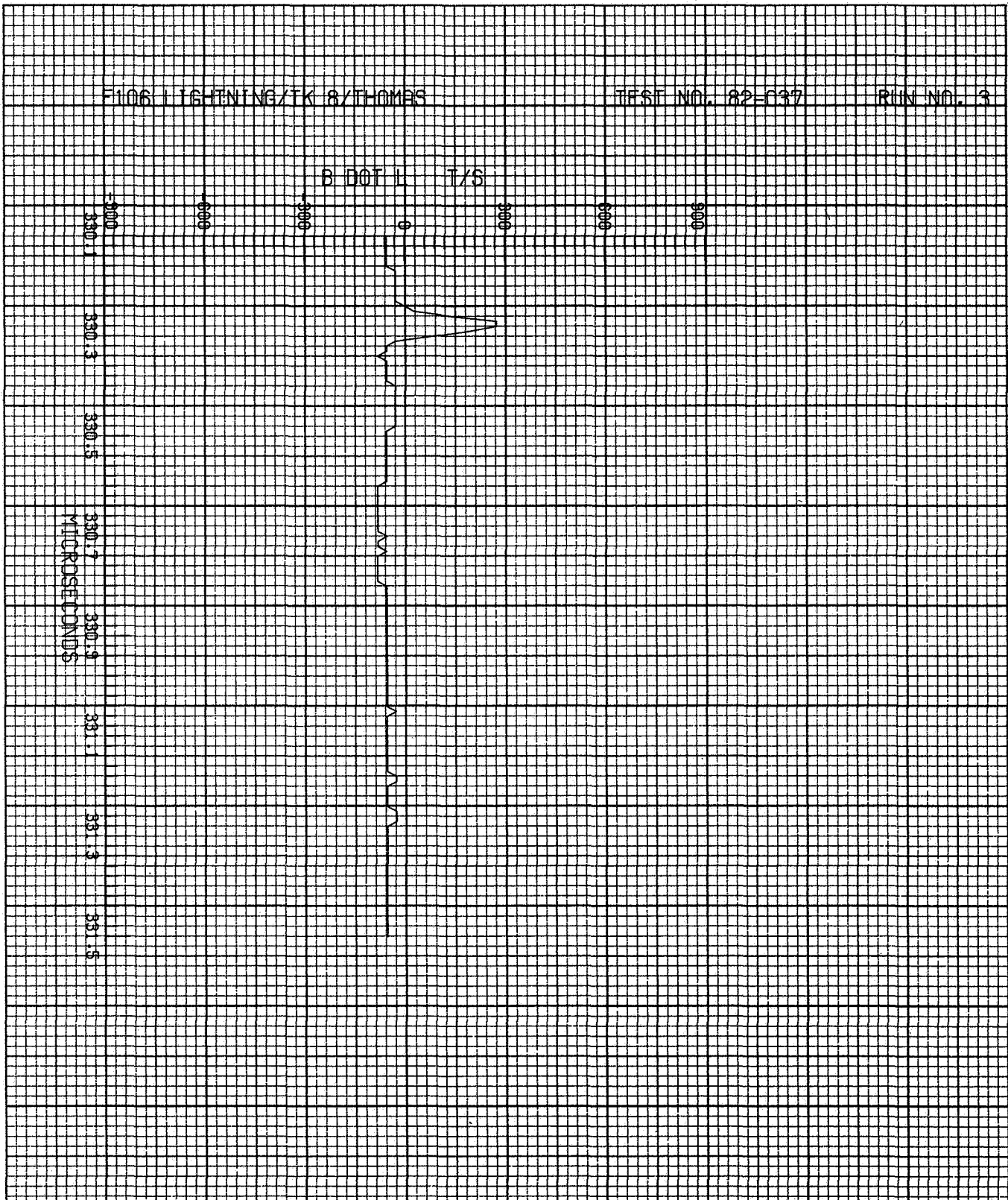
F106 LIGHTNING/TK 8/THOMBS

TEST NO. 82-C37

RUN NO. 3



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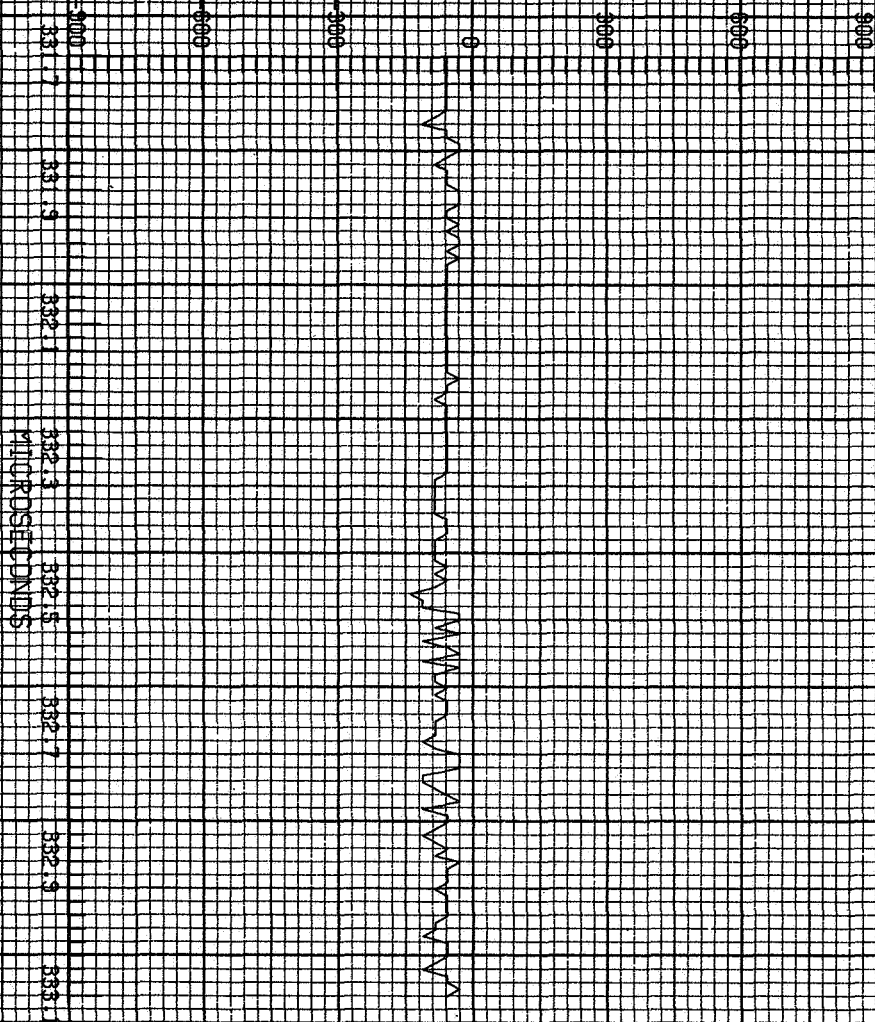
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F106 LIGHTNING/TK 8/THOMBS

TEST NO. 82-637

RUN NO. 3

B DOT L T/S



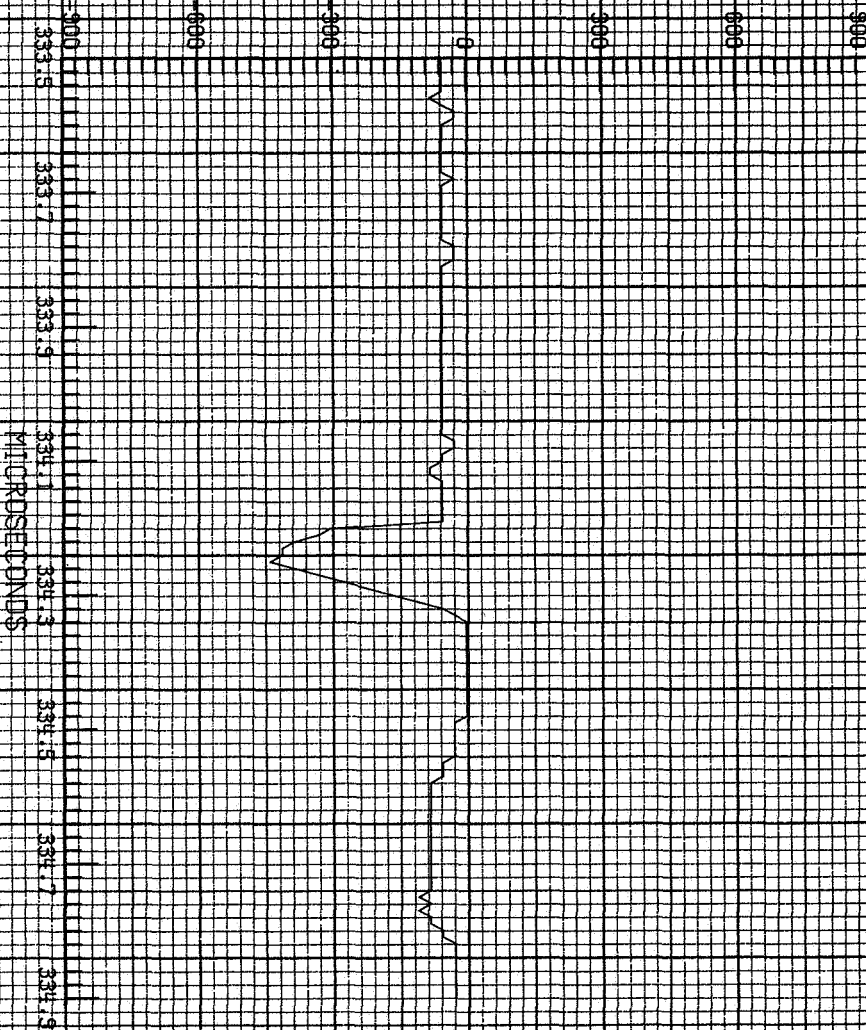
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F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-637

RUN NO. 3

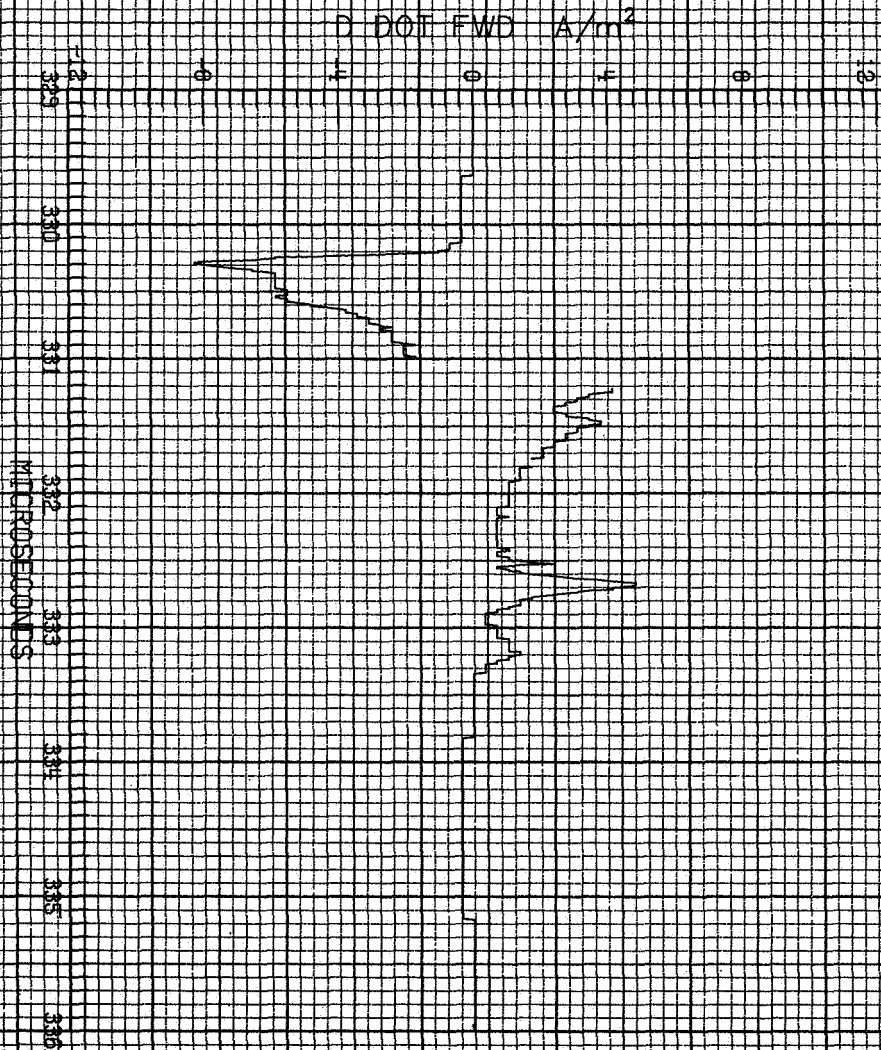
B DOT L T/S



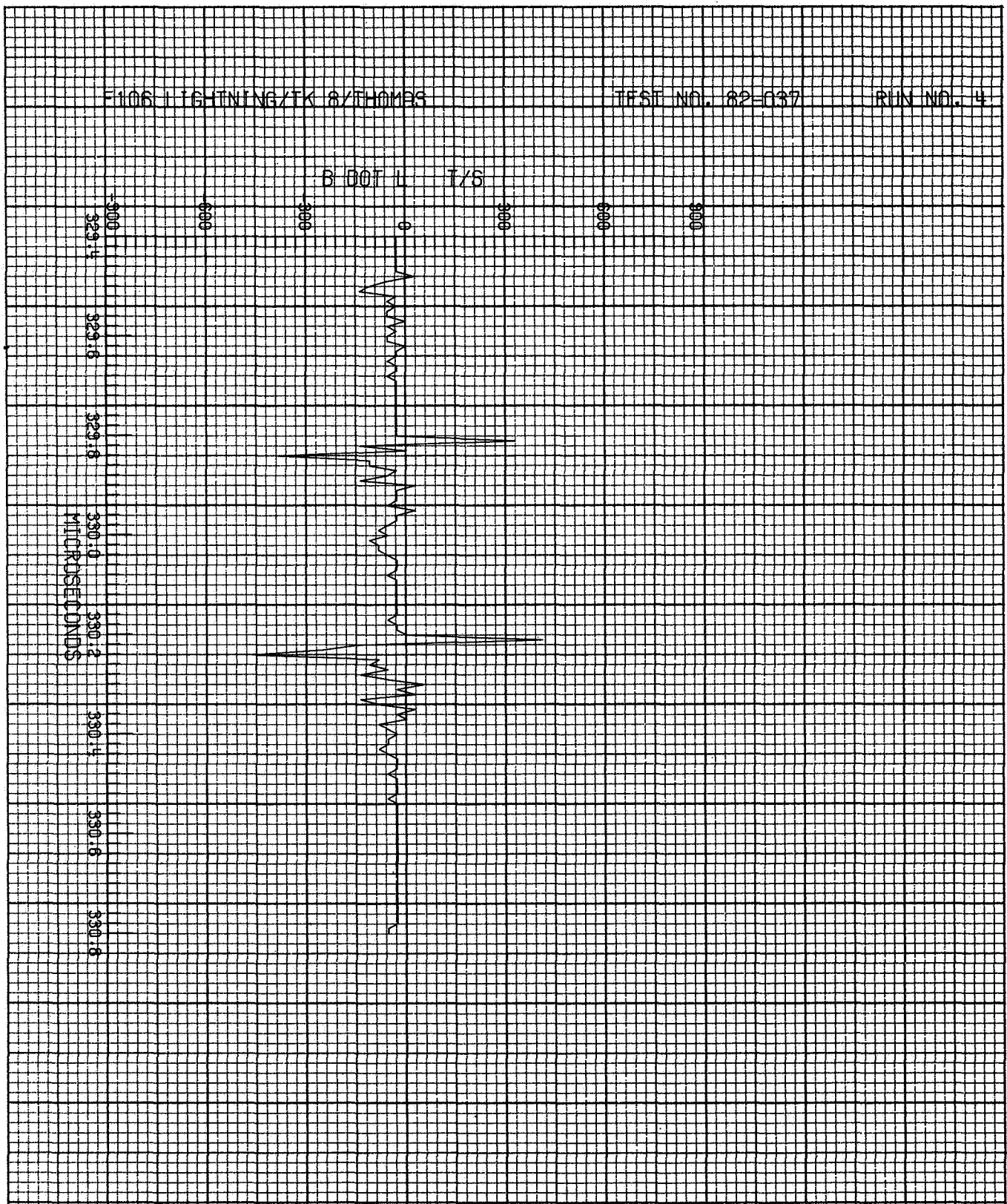
F106 LIGHTNING/TK 10/THOMAS

TEST NO. 82-037

RUN NO. 3



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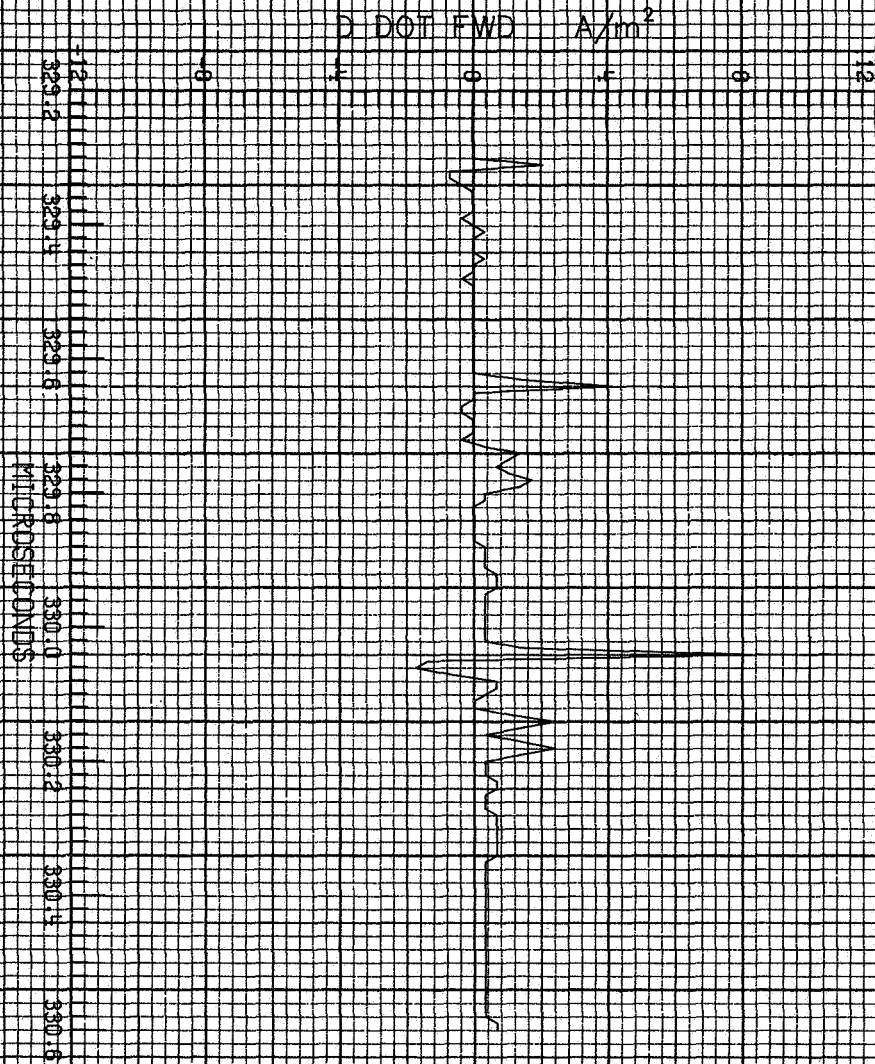


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1106 LIGHTNING/TK 10/THOMES

TEST NO. 82-637

RUN NO. 4



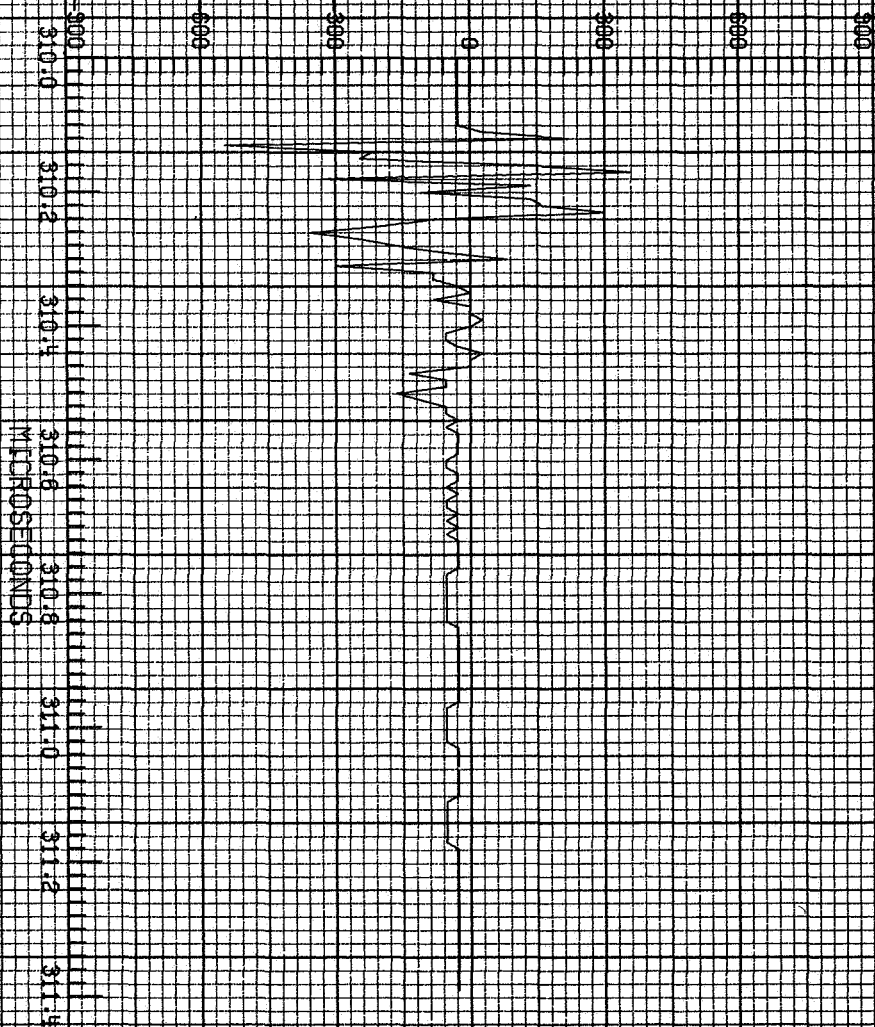
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F106 LIGHTNING/FK 8/THOMAS

TEST NO. 82-038

RUN NO. 1

B DOT L T/S

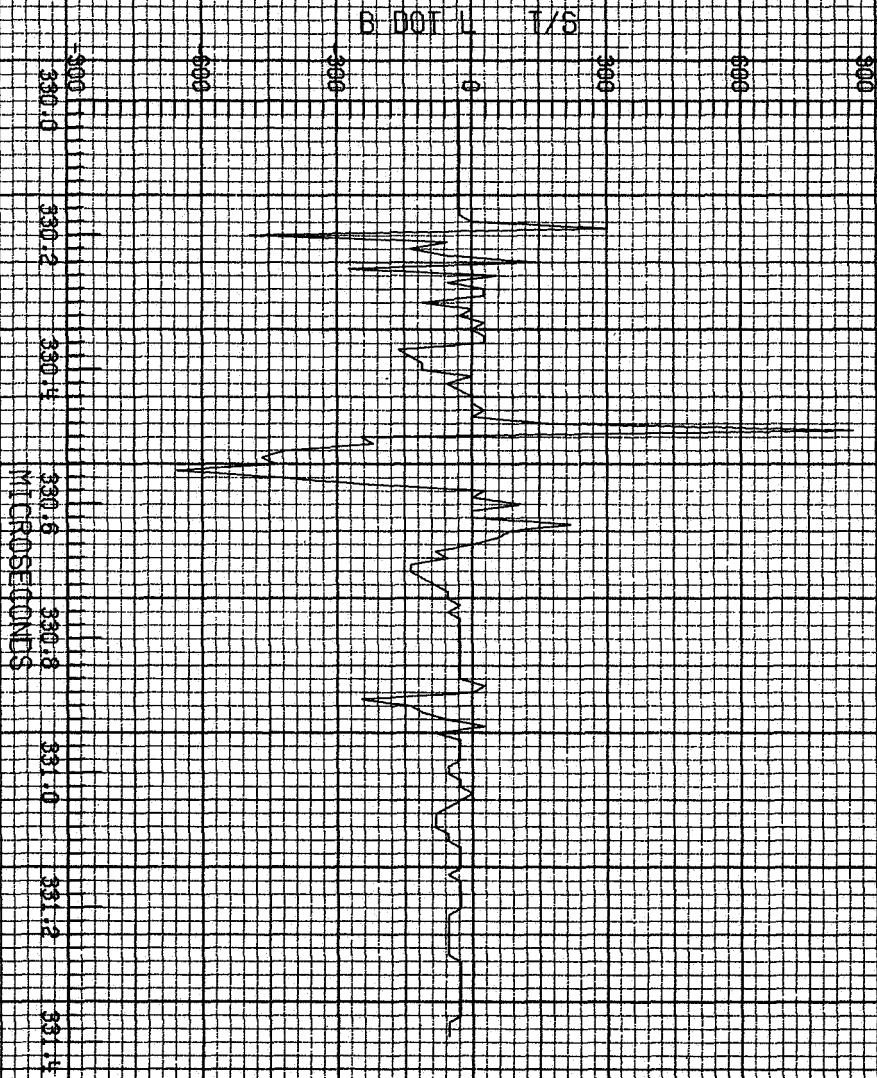


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F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-038

RUN NO. 2

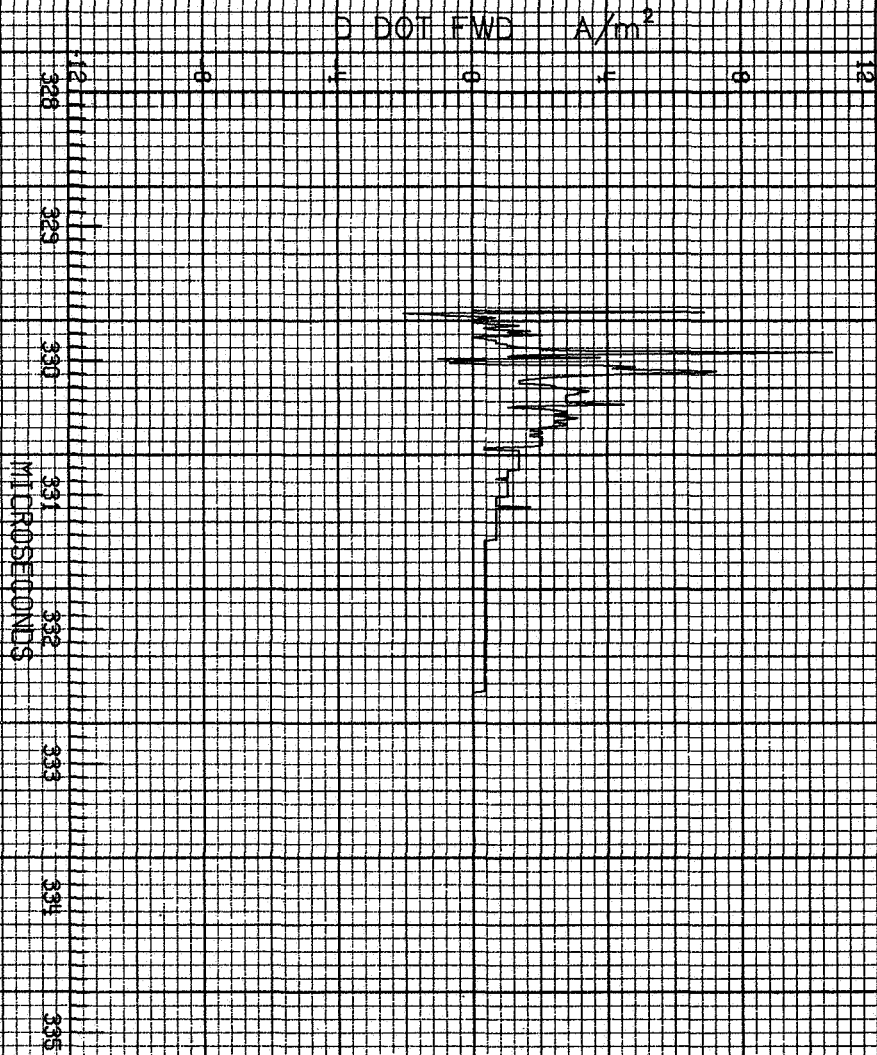


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F106 LIGHTNING/TK 10/THOMES

TEST NO. 82-038

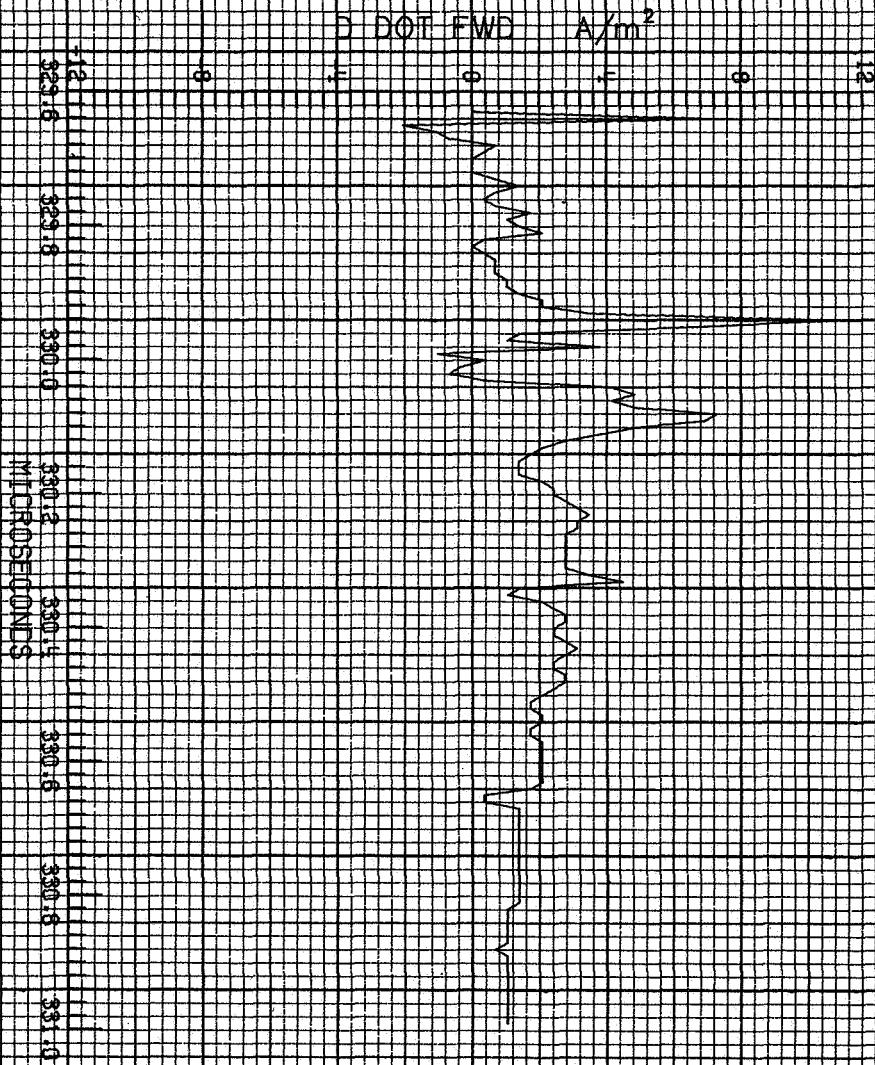
RUN NO. 2



F106 LIGHTNING/TK 10/THOMAS

TEST NO. 82-038

RUN NO. 2

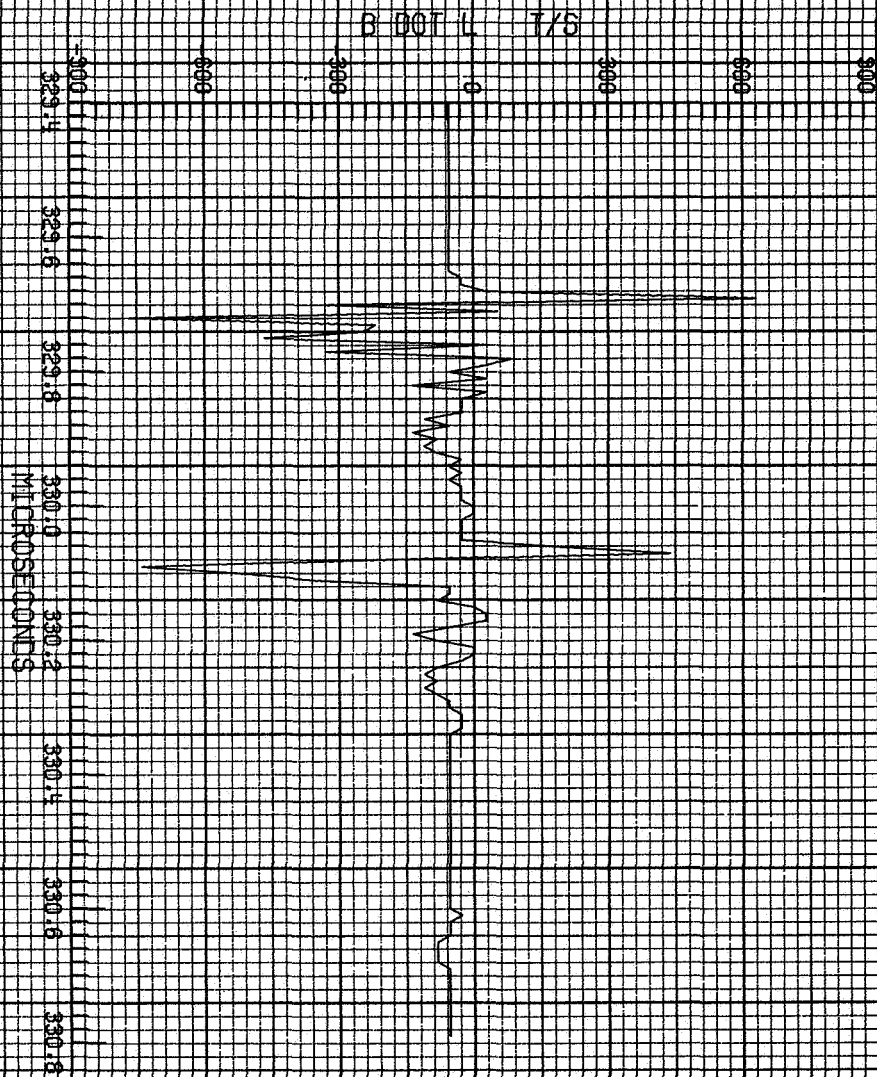


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F106 LIGHTNING/TK 8/THOMBS

TEST NO. 82-036

RUN NO. 3



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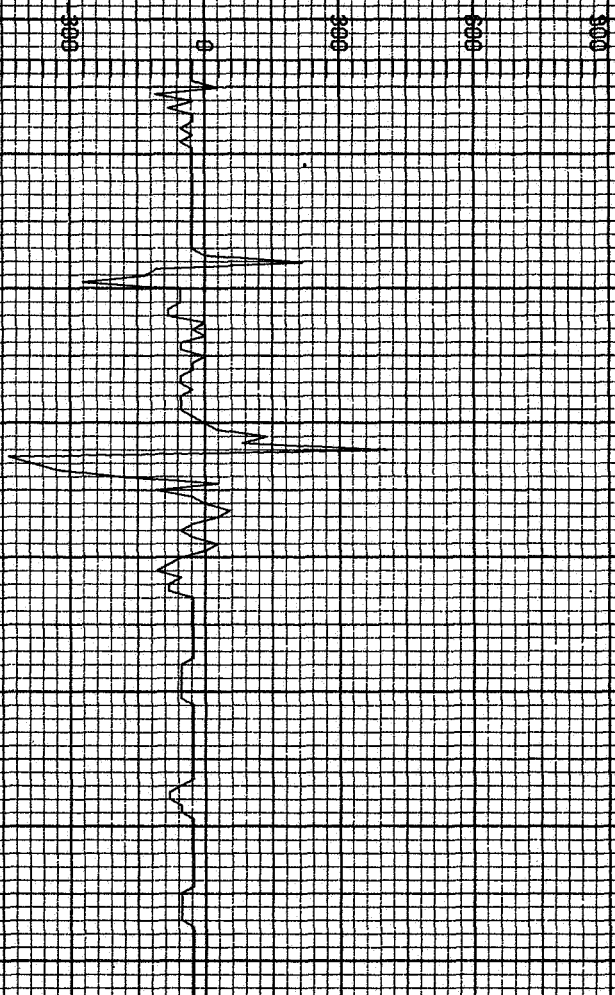
F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-038

RUN NO. 4

B DOT L T/S

329.6
329.8
330.0
330.2
330.4
330.6
330.8
331.0
MICROSECONDS

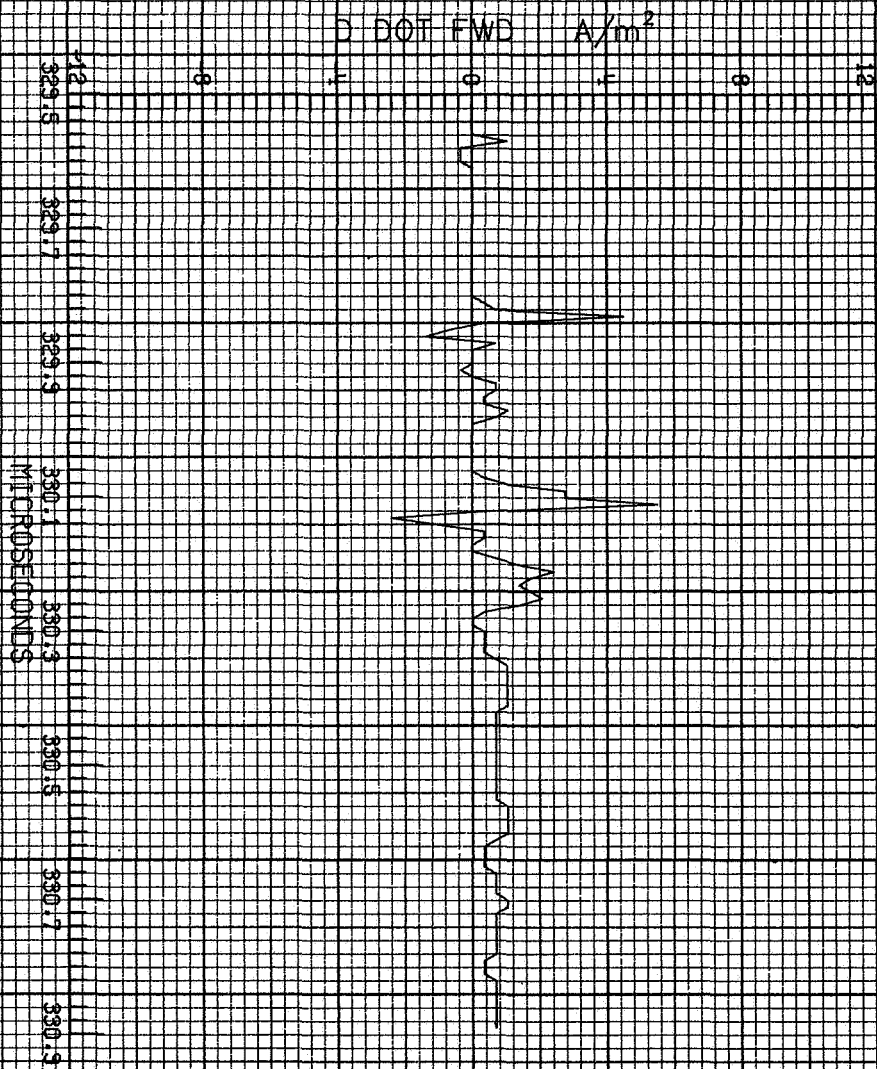


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F106 LIGHTNING/TK 10/THOMAS

TEST NO. 82-038

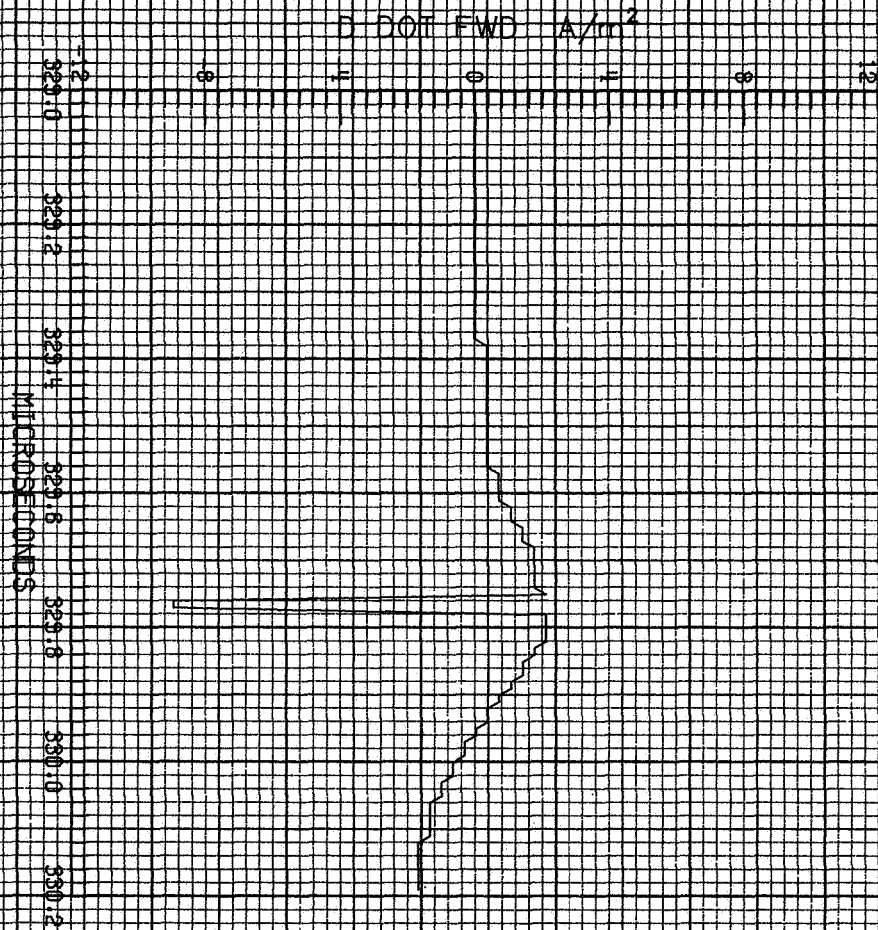
RUN NO. 4



F106 LIGHTNING/TK 10/THOMAS

TEST NO. 82-038

RUN NO. 5



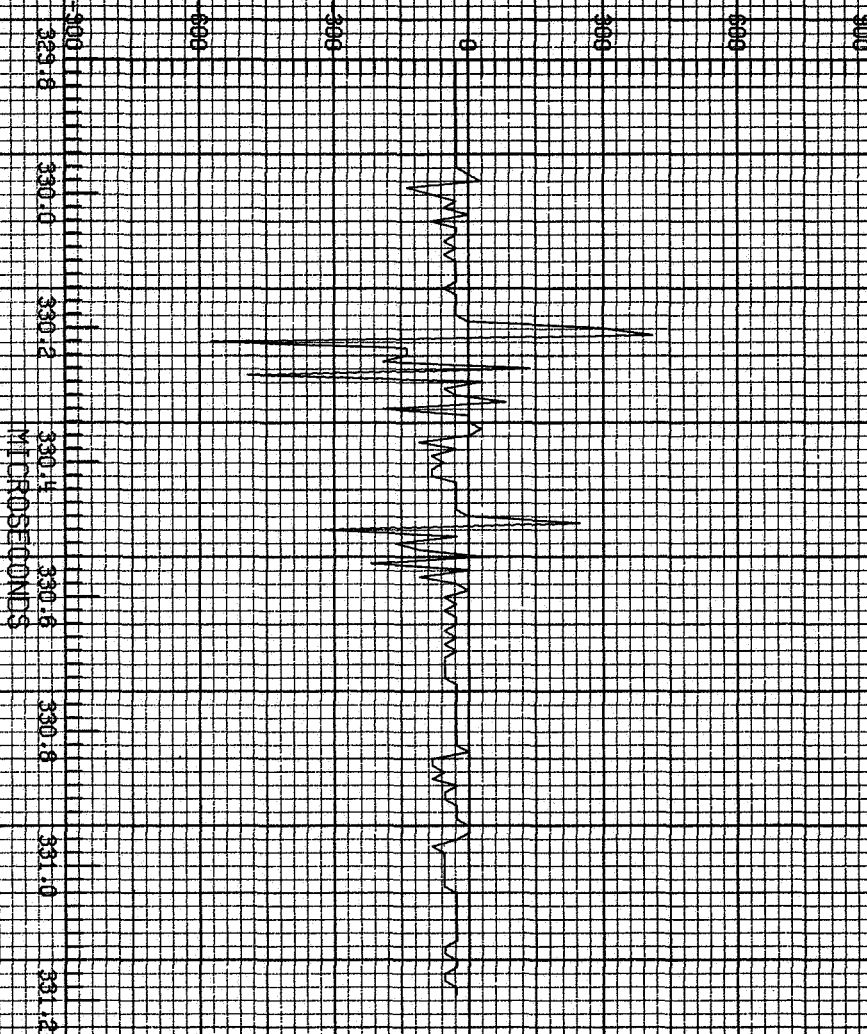
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F106 LIGHTNING/TK 8/THOMBS

TEST NO. 82-038

RUN NO. 5

B DOT L T/S

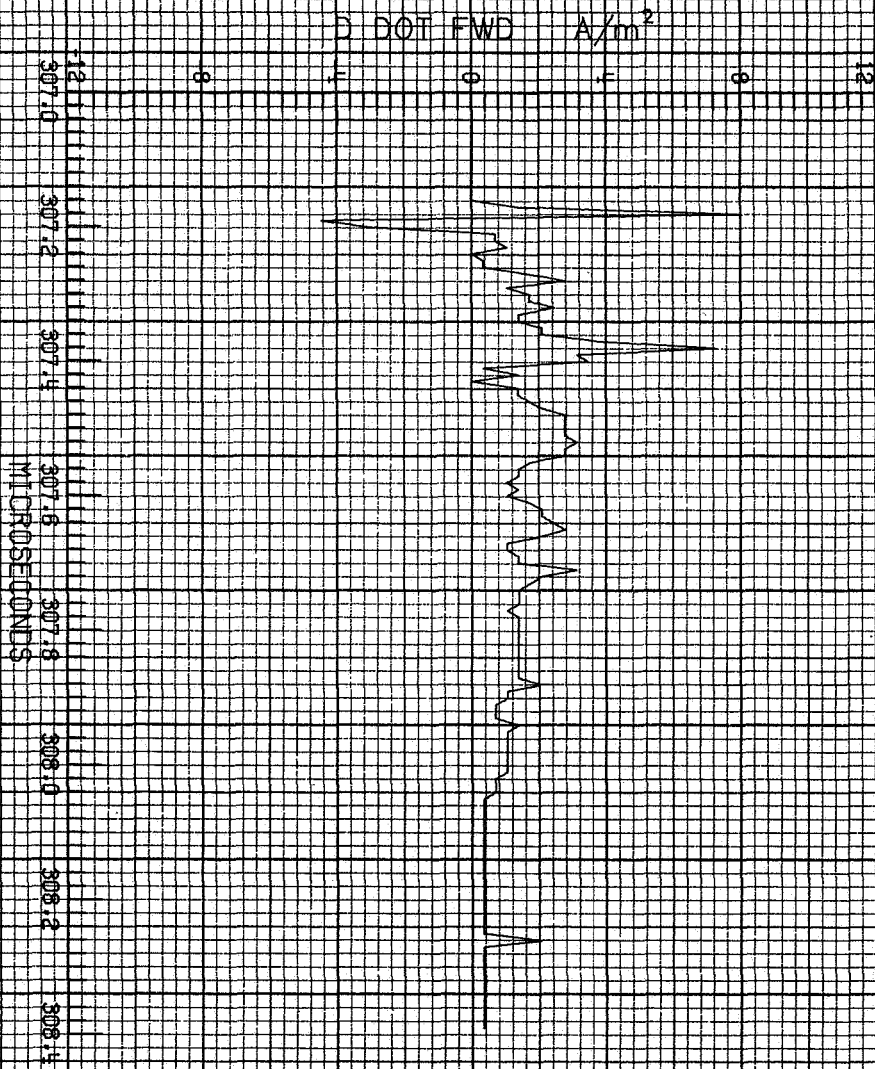


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F106 LIGHTNING/FK 10/THOMAS

TEST NO. 82-038

RUN NO. 6

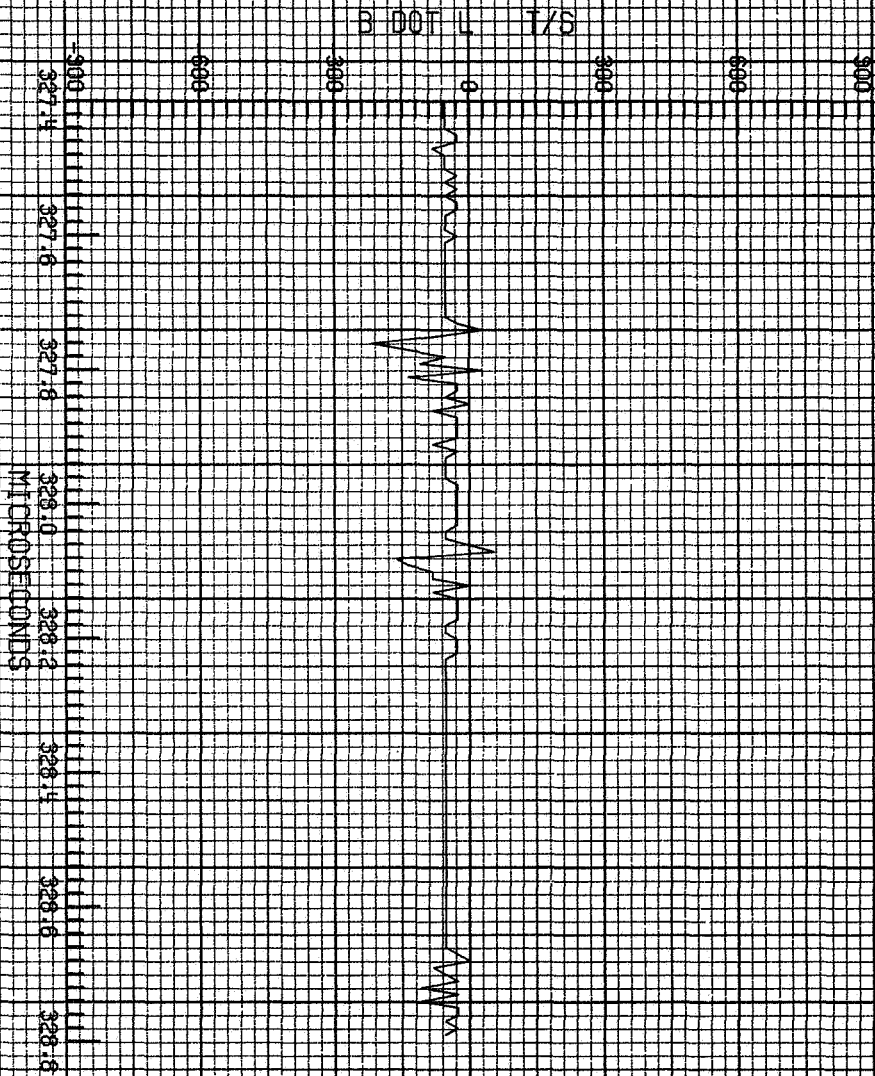


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F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-038

RUN NO. 7

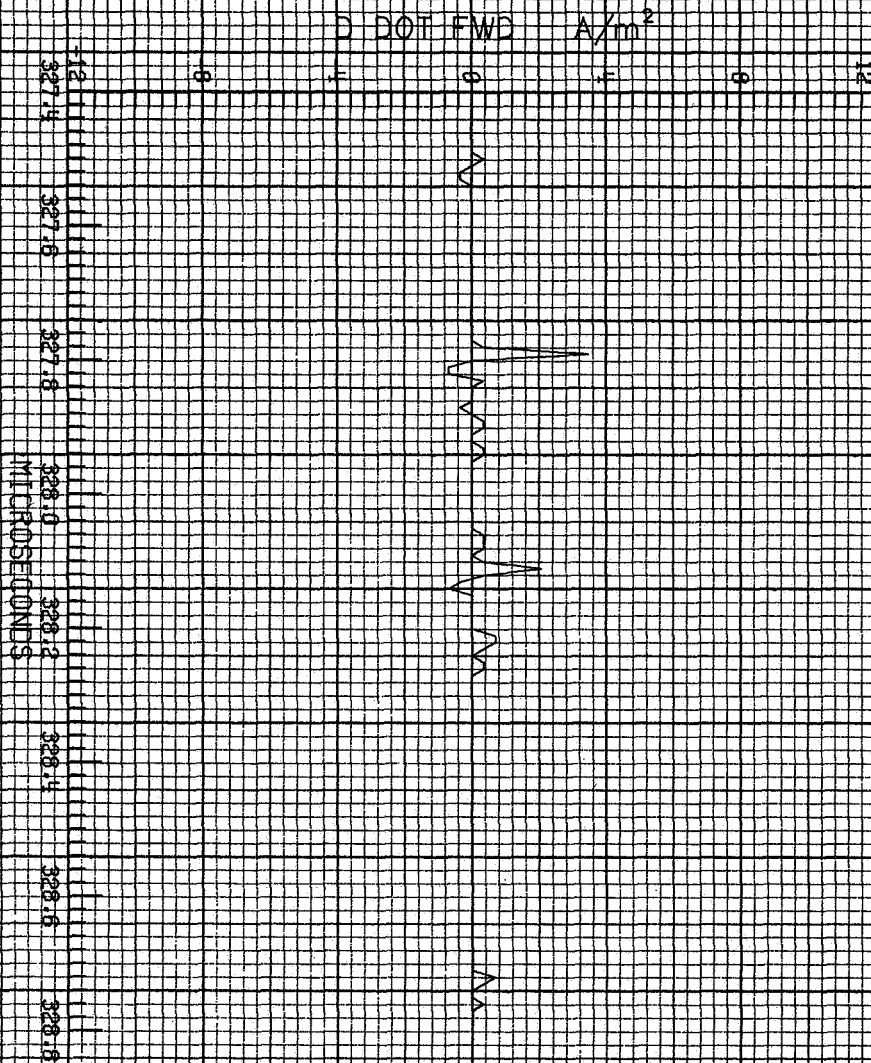


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F106 LIGHTNING/TK 10/THOMAS

TEST NO. 82-038

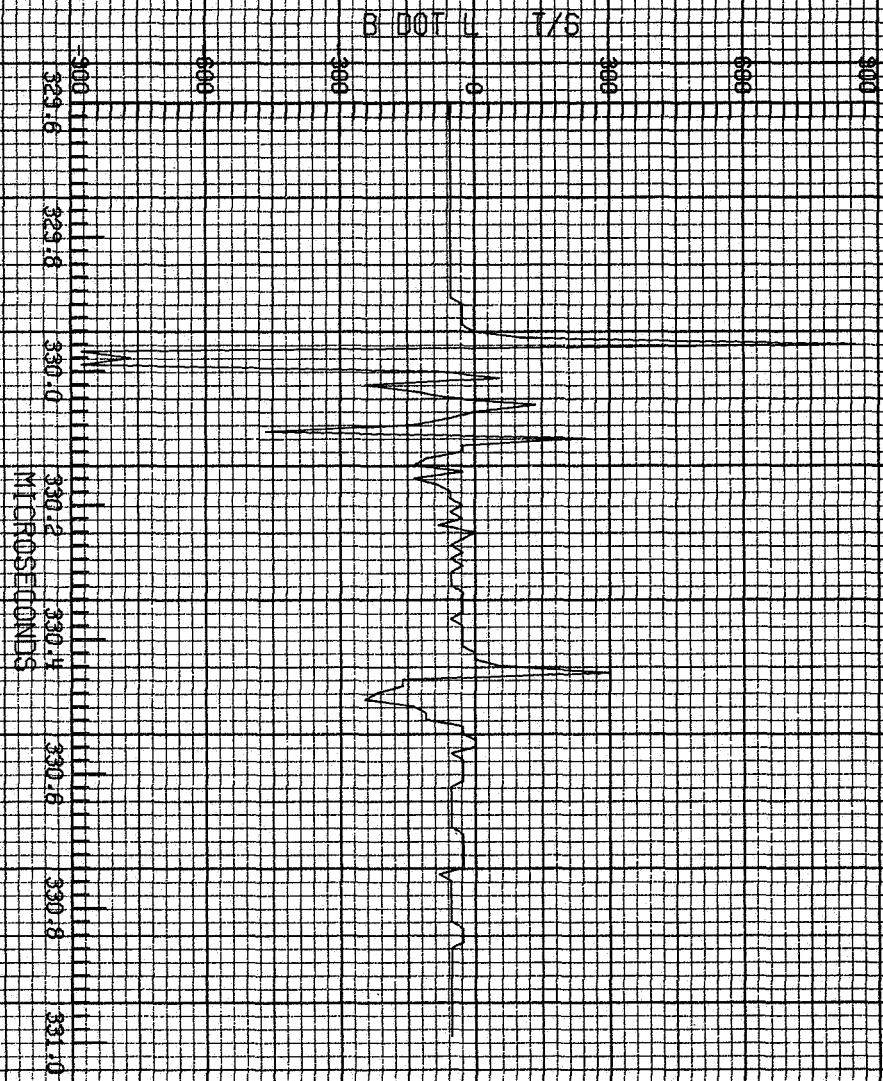
RUN NO. 7



F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-036

RUN NO. 7

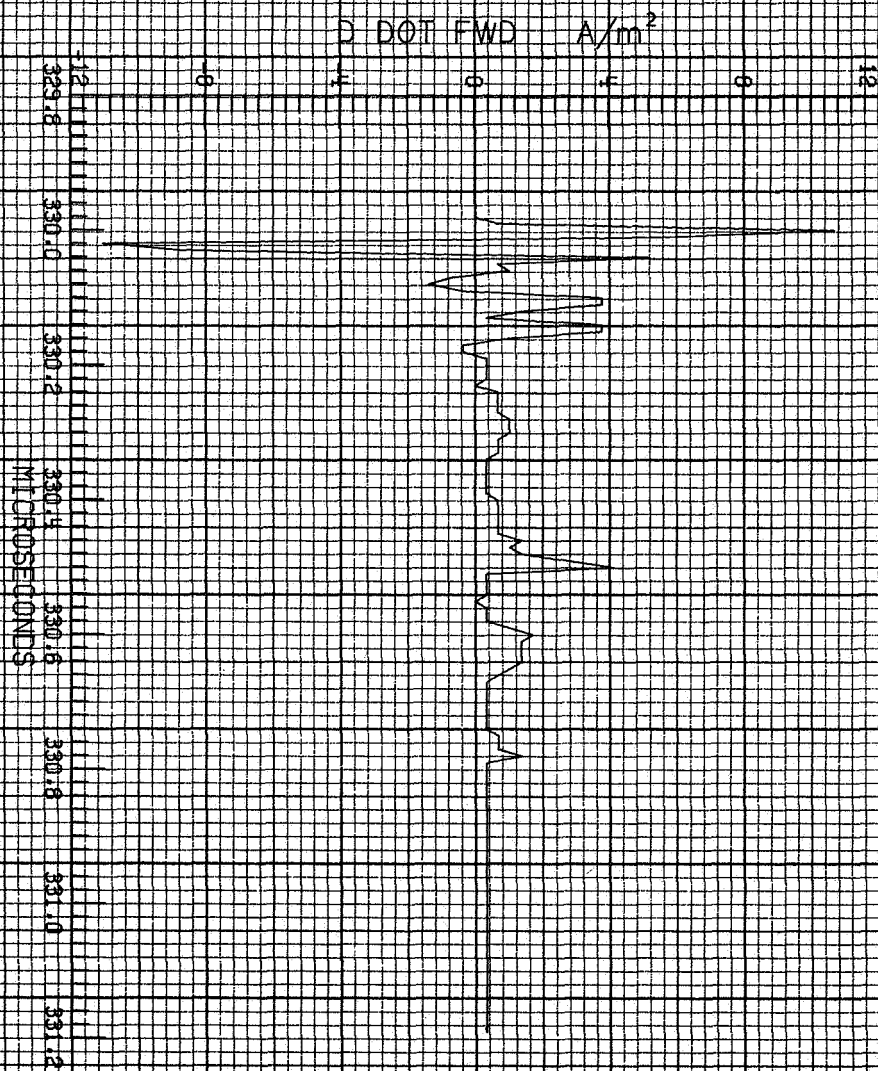


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106 LIGHTNING/TK 10/THOMAS

TEST NO. 82-C38

RUN NO. 7



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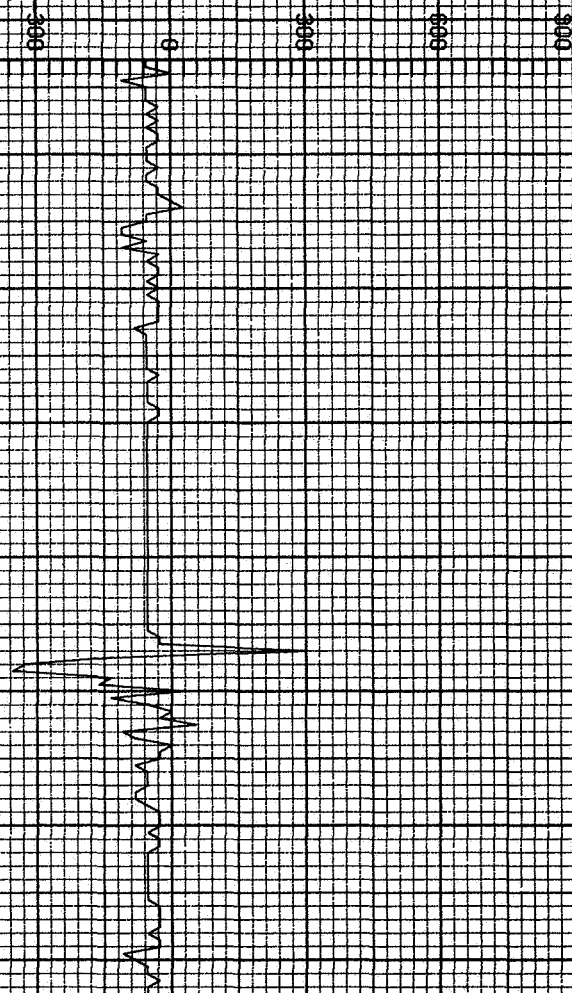
F106 LIGHTNING/TK 8/THOMBS

TEST NO. 82-038

RUN NO. 8

B DOT L T/S

329.1
329.3
329.5
329.7
329.9
330.1
330.3
330.5
MICROSECONDS



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F106 LIGHTNING/TK 10/THOMAS

TEST NO. 82-038

RUN NO. 8

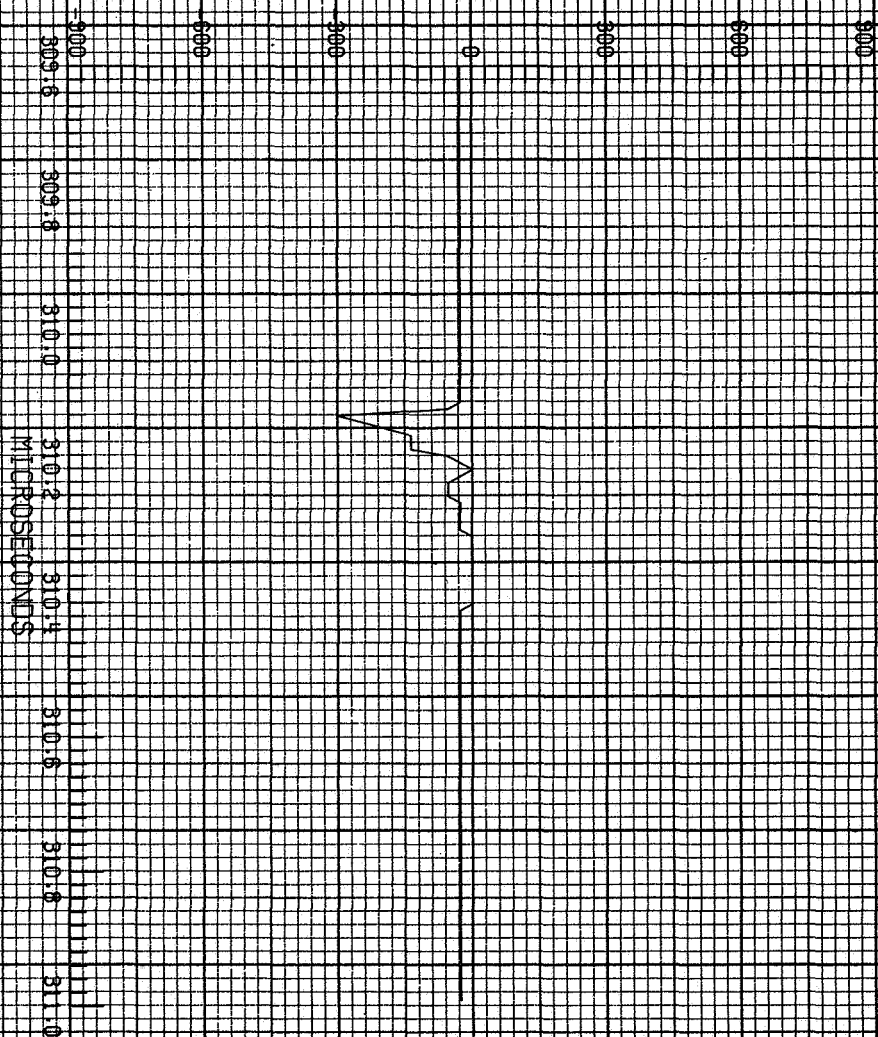


F106 LIGHTNING/TK8/M.THOMAS

TEST NO. 089

RUN NO. 1

B DOT L T/S

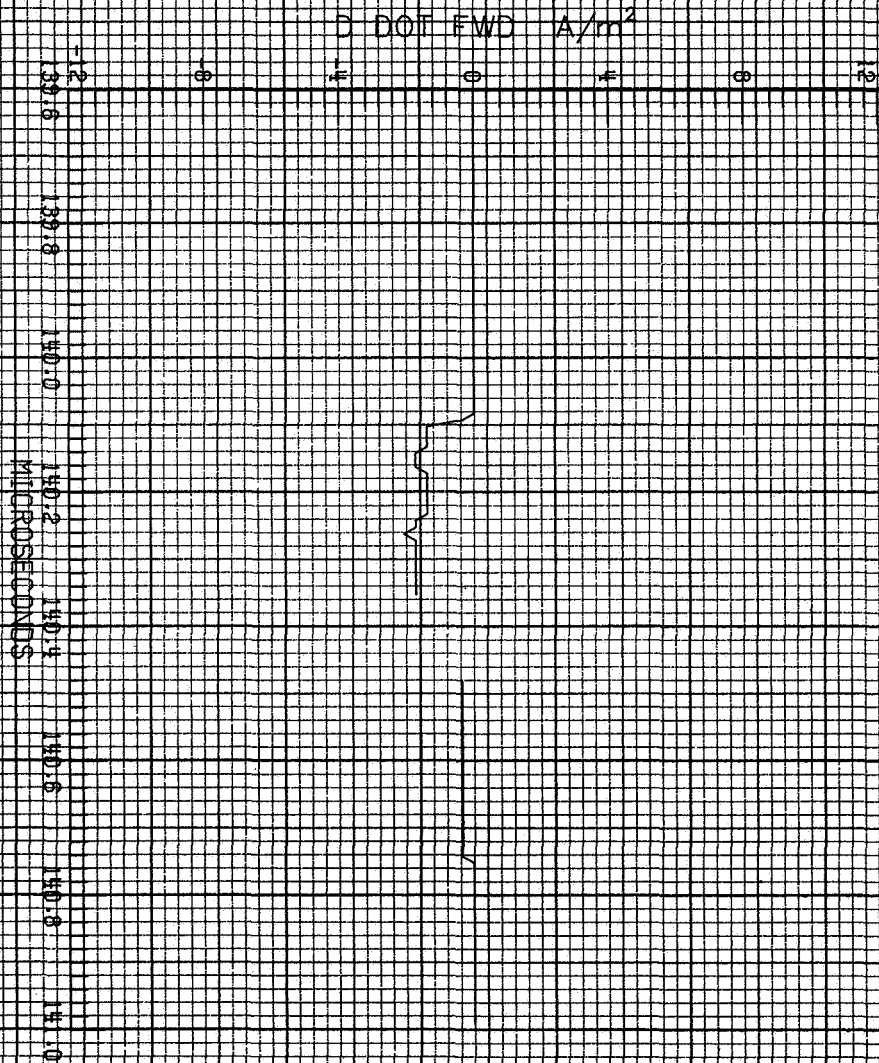


ORIGINAL PAGE IS
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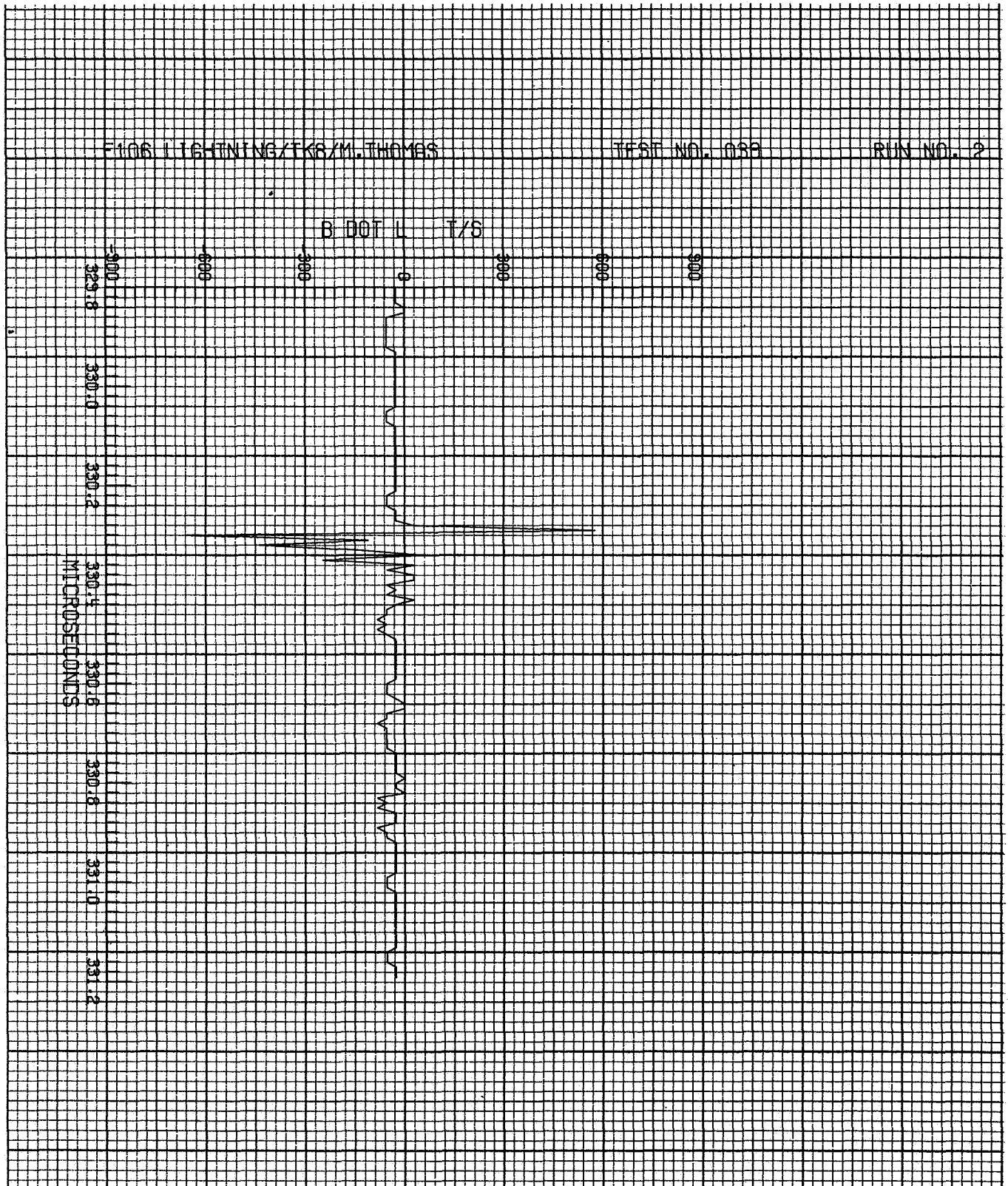
F106 LIGHTNING/TK10/M. THOMAS

TEST NO. 039

RUN NO. 1



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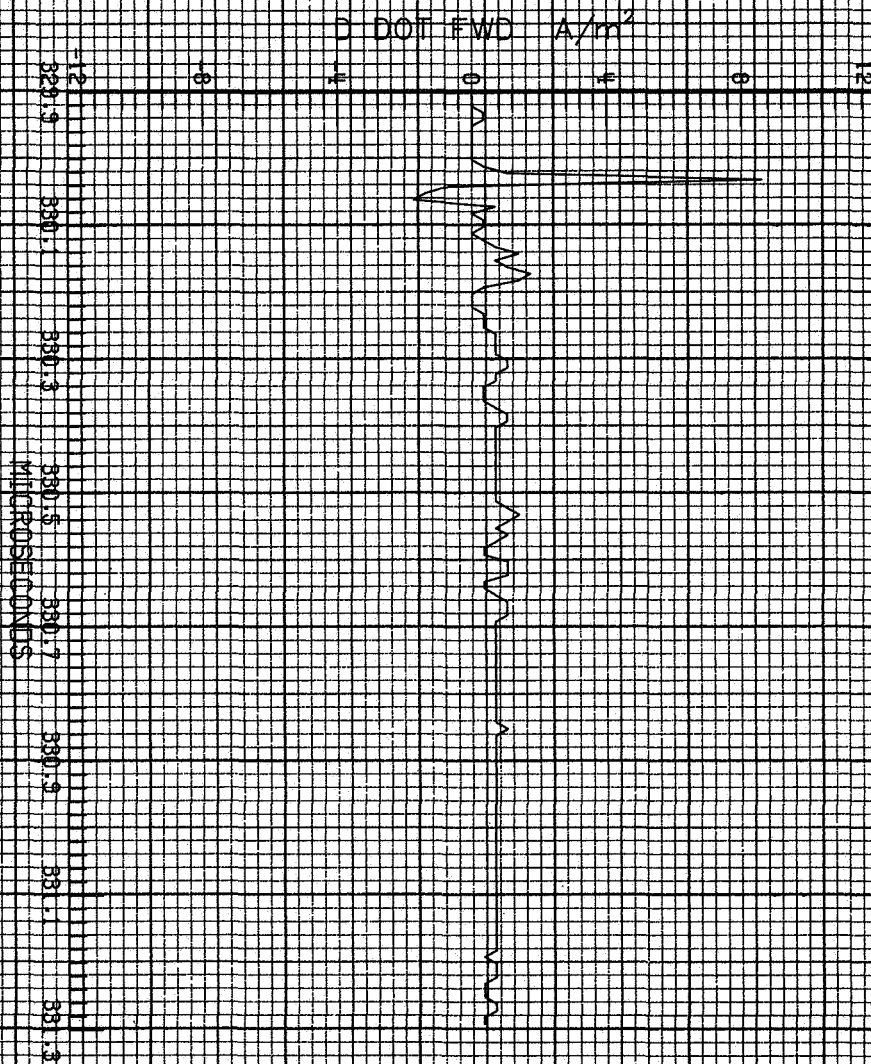


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F106 LIGHTNING/TK10/M.THOMAS

TEST NO. 039

RUN NO. 2



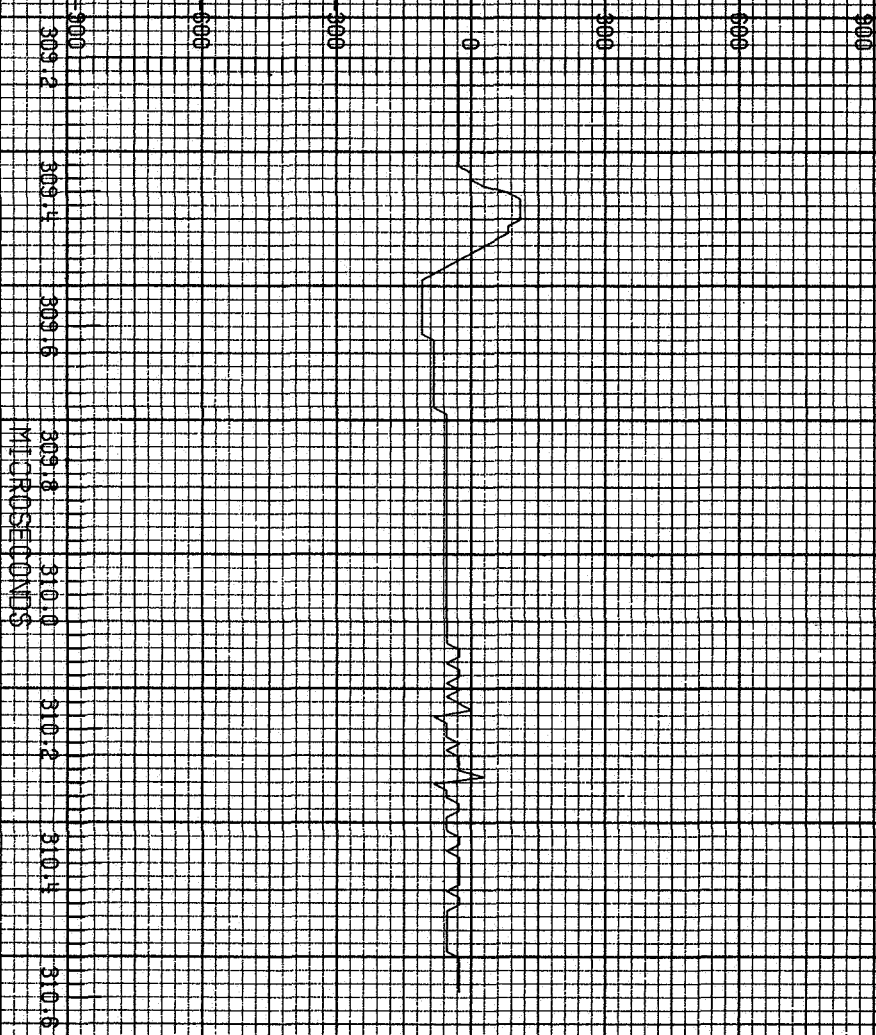
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F106 LIGHTNING/TK6/M.THOMAS

TEST NO. 040

RUN NO. 1

B DOT L T/S

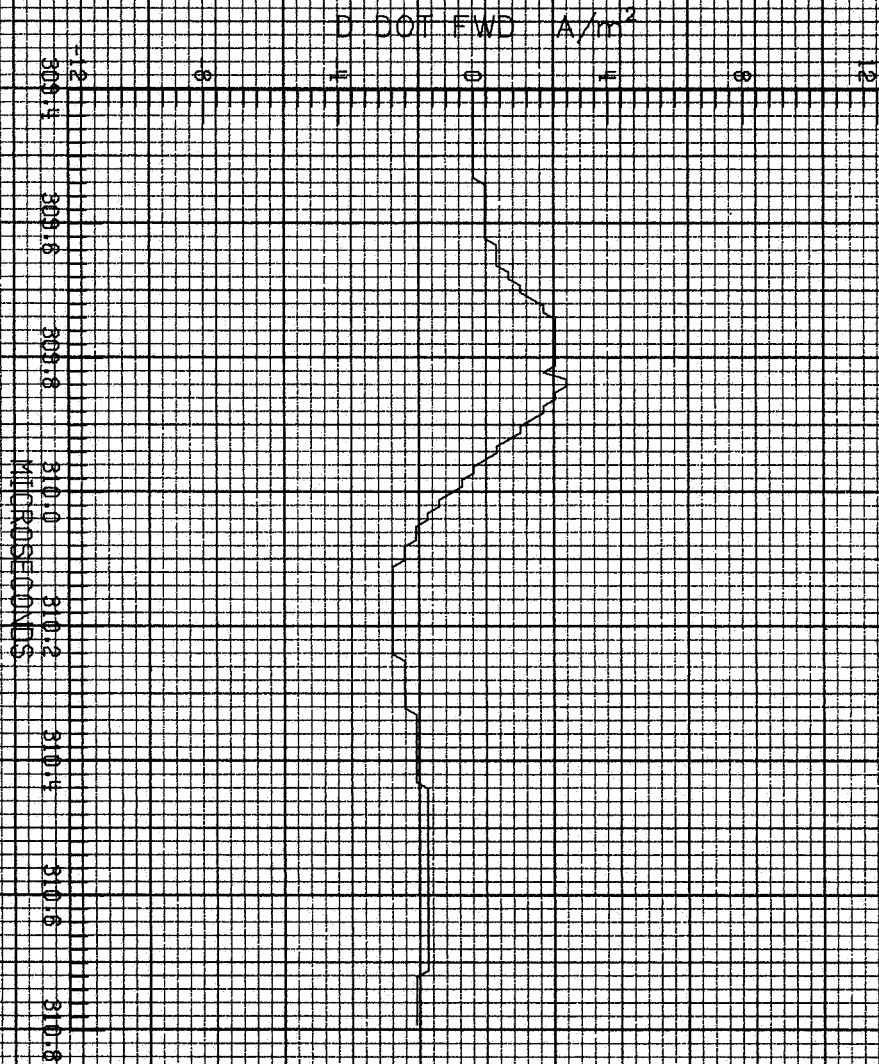


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F106 LIGHTNING/TK10/M. THOMAS

TEST NO. 040

RUN NO.

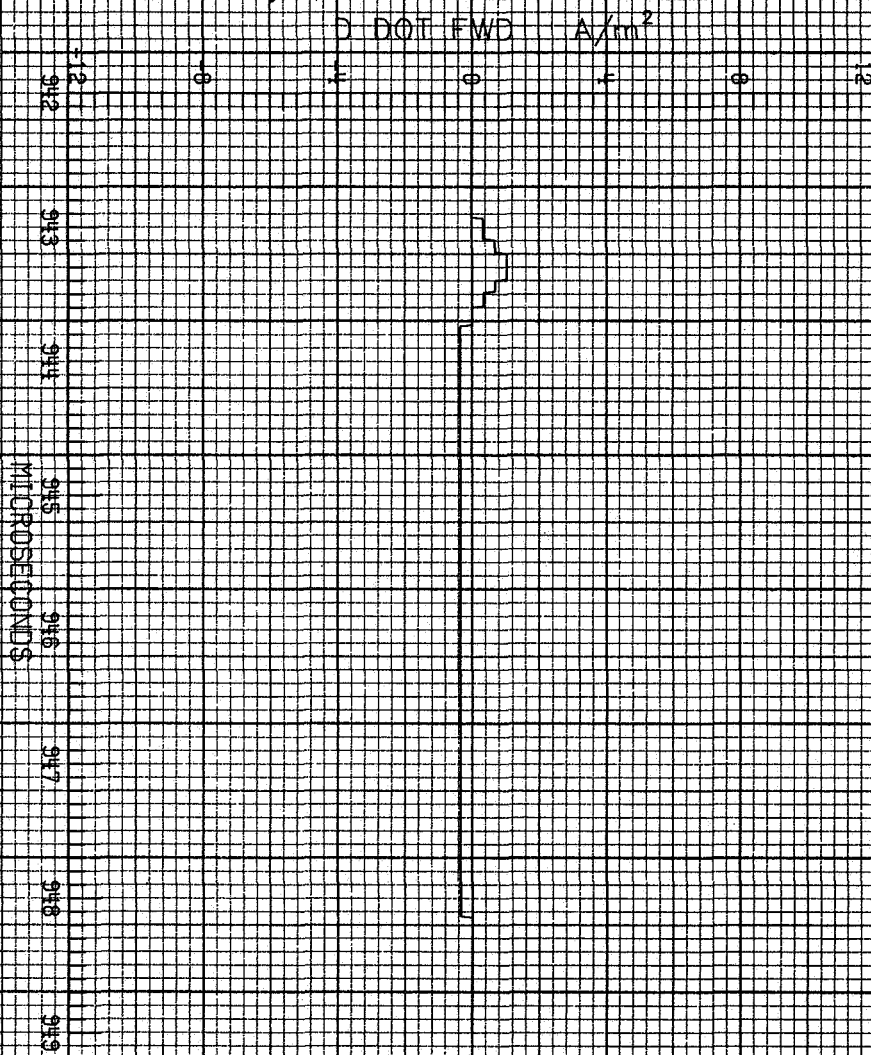


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F106 LIGHTNING/TK10/M. THOMAS

TEST NO. 040

RUN NO. 1



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F106 LIGHTNING/TK8/M. THOMAS

TEST NO. 047

RUN NO. 2

B DOT L T/S

300
330.0
330.2
330.4
330.6
330.8
331.0
331.2
331.4
MICROSECONDS

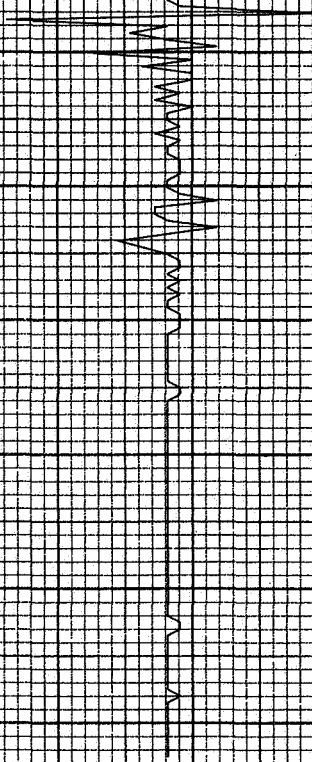
600

300

0

300

600



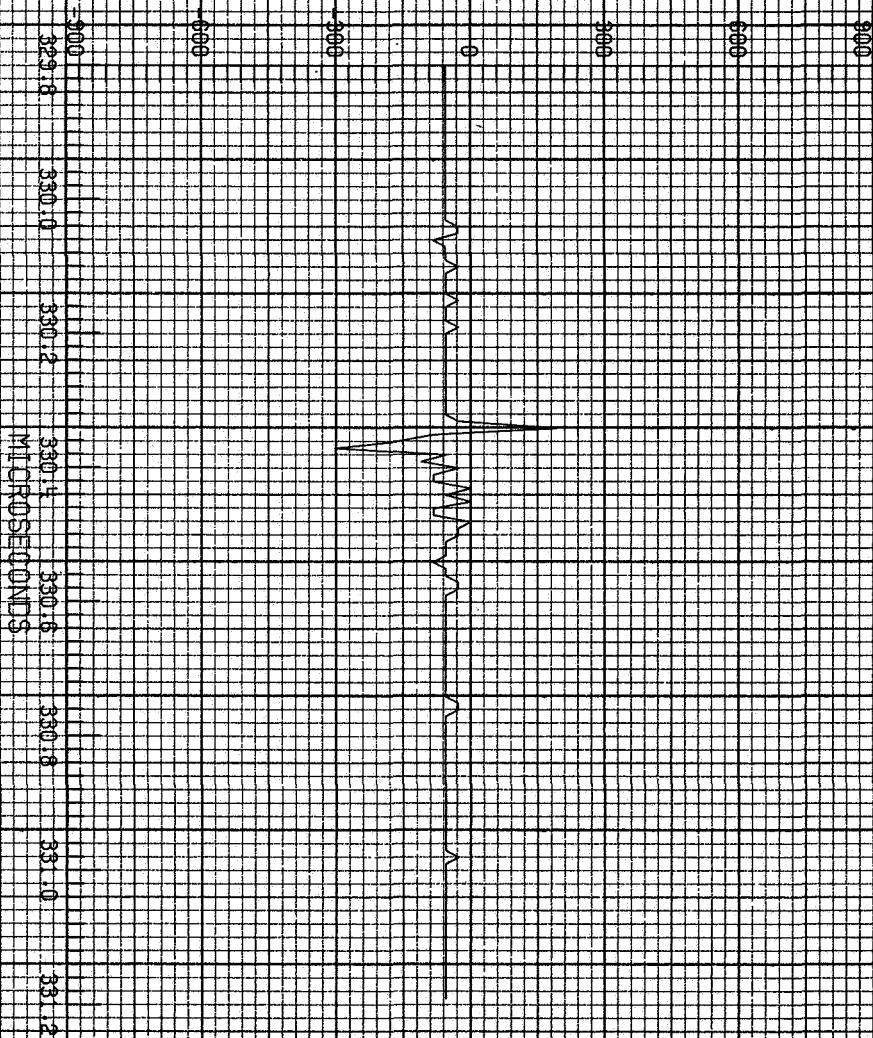
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F106 LIGHTNING/TK6/M.THOMAS

TEST NO. 040

RUN NO. 3

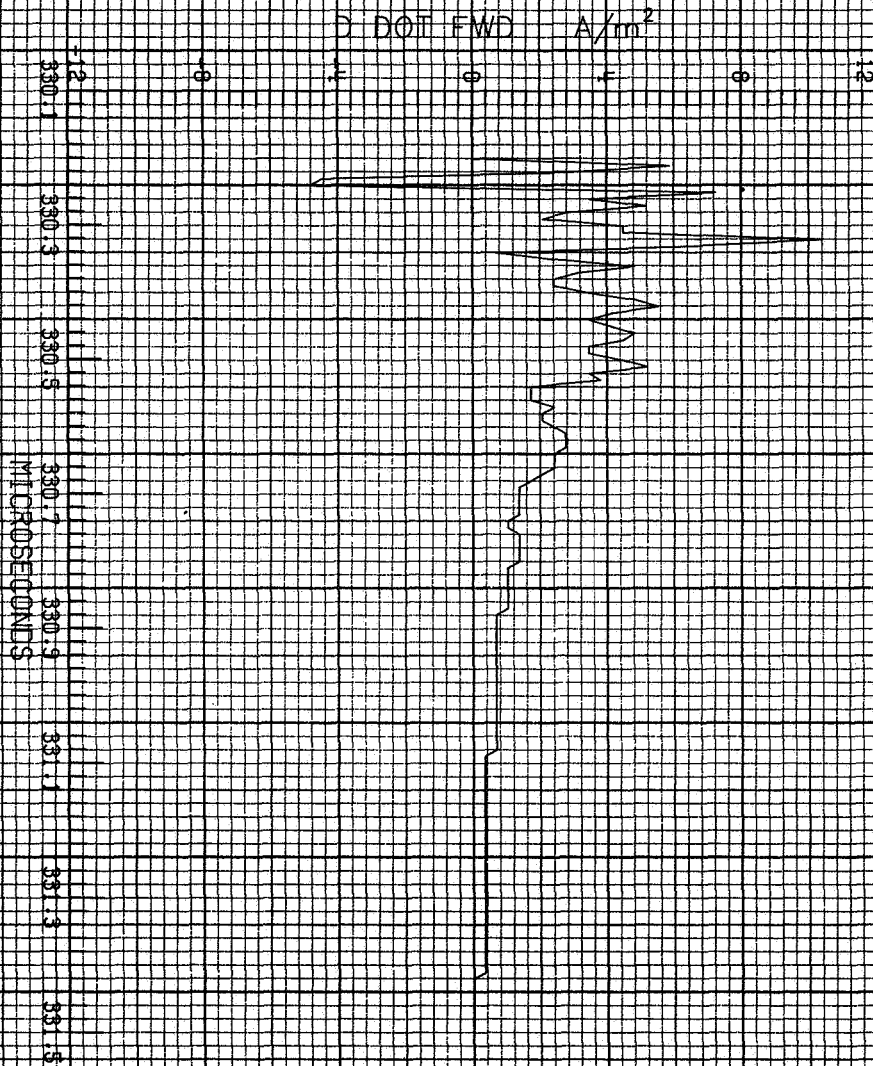
B DOT L T/S



F106 LIGHTNING/TK10/M.THOMAS

TEST NO. 040

RUN NO. 3

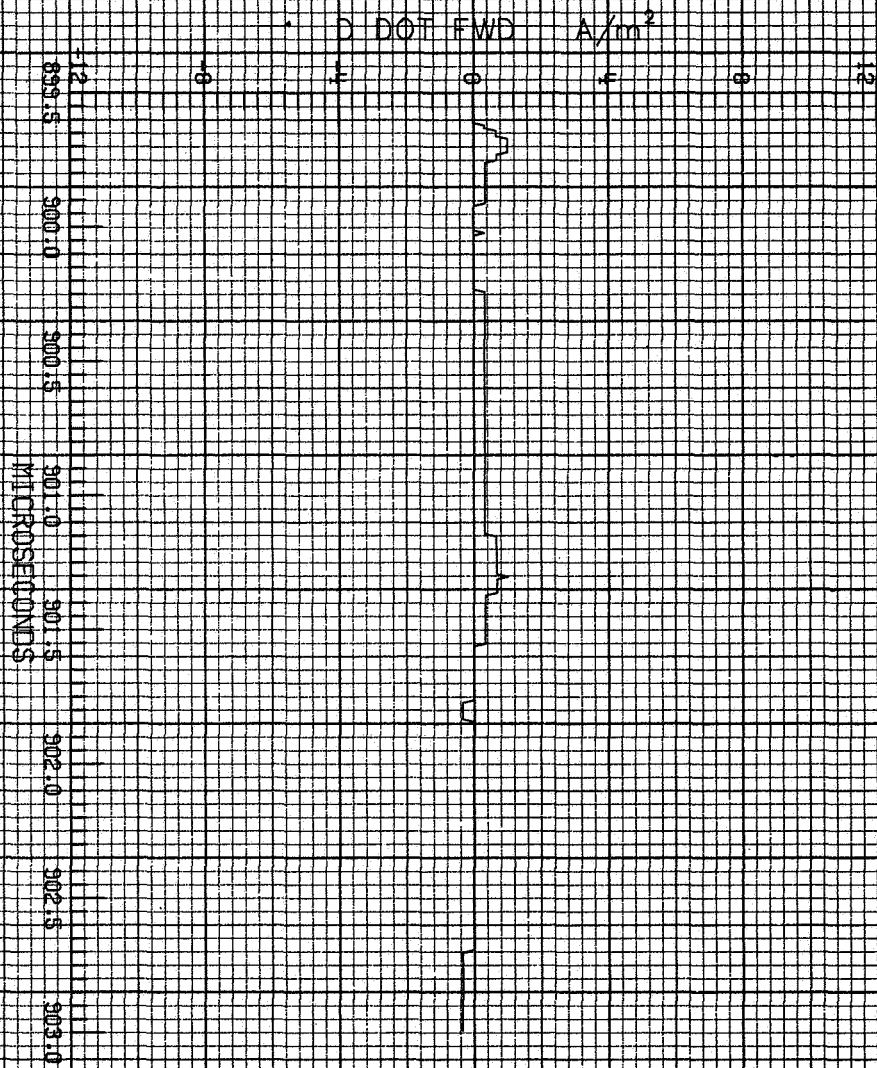


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F106 LIGHTNING/TK10/M.THOMAS

TEST NO. 040

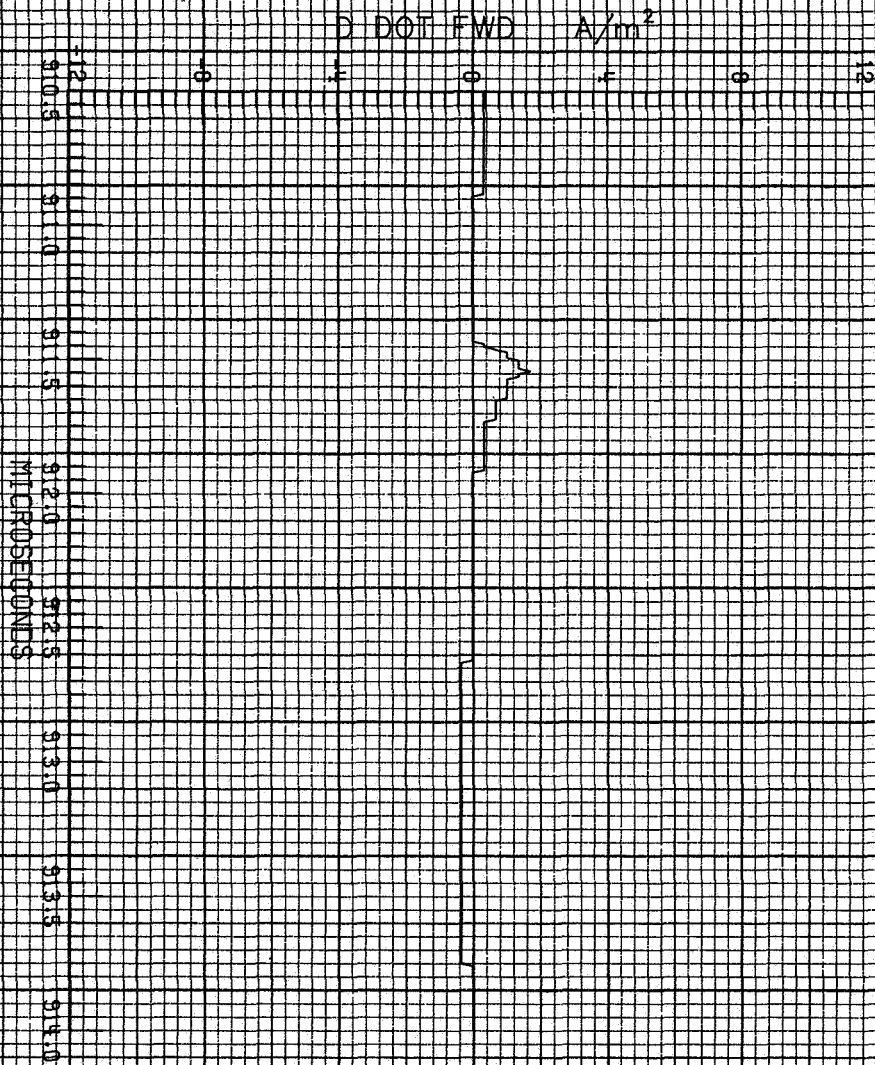
RUN NO. 3



E106 LIGHTNING/TK10/M.THOMAS

TEST NO. 040

RUN NO. 3



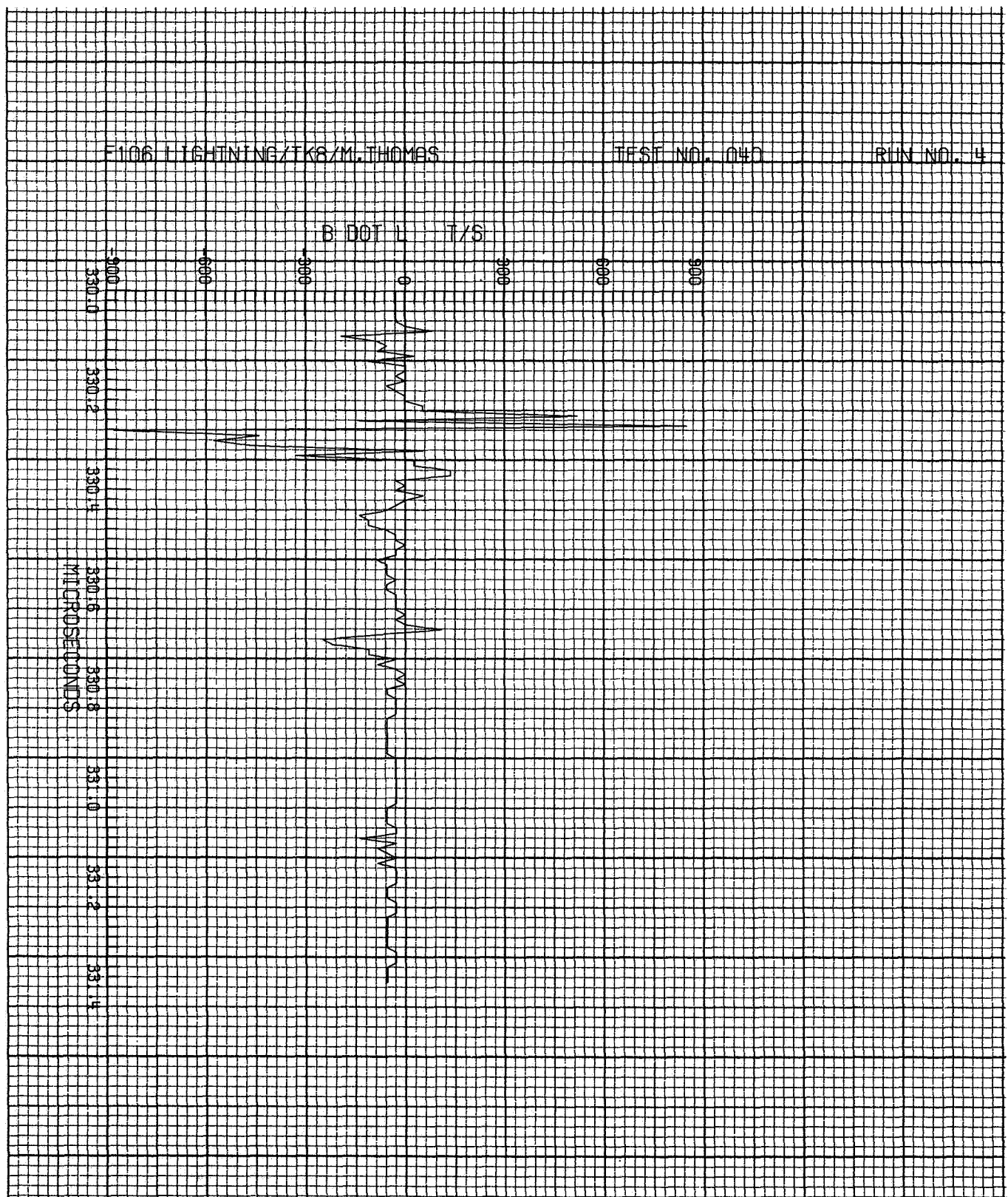
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F106 LIGHTNING/TK10/M.THOMAS

TEST NO. 040

RUN NO. 3





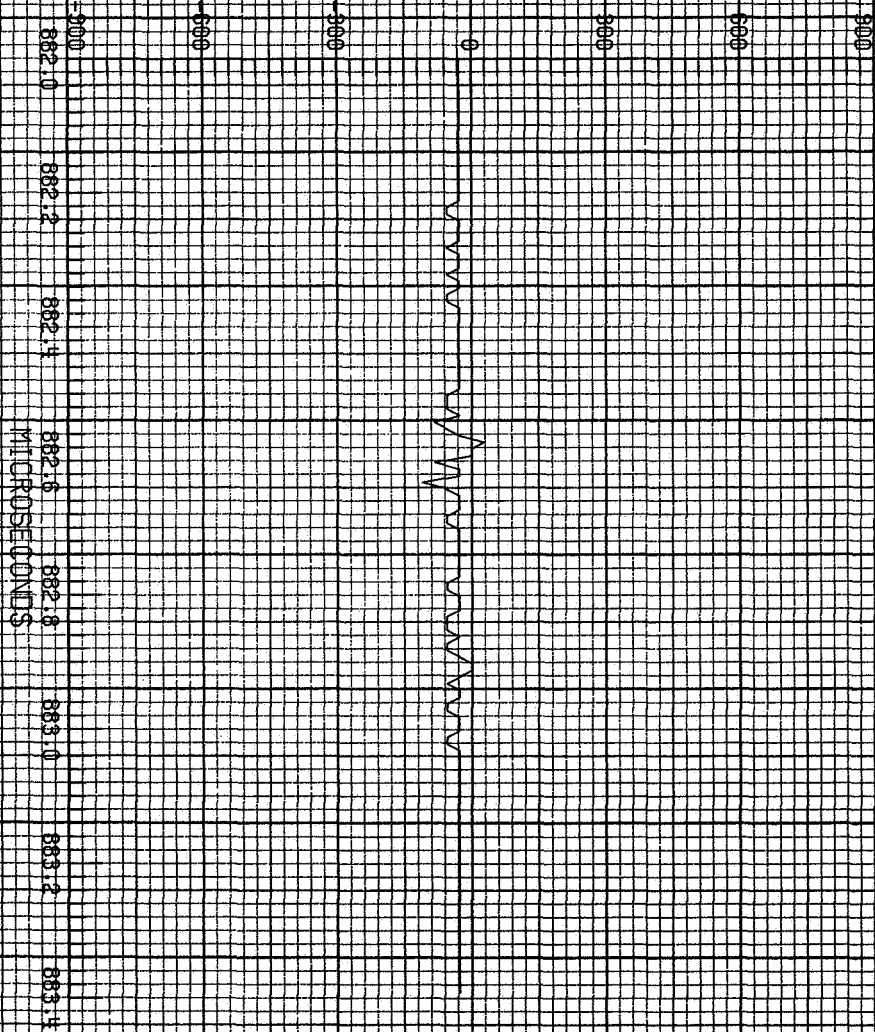
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F106 LIGHTNING/TKS/M. THOMAS

TEST NO. 040

RUN NO. 4

B DOT L T/S

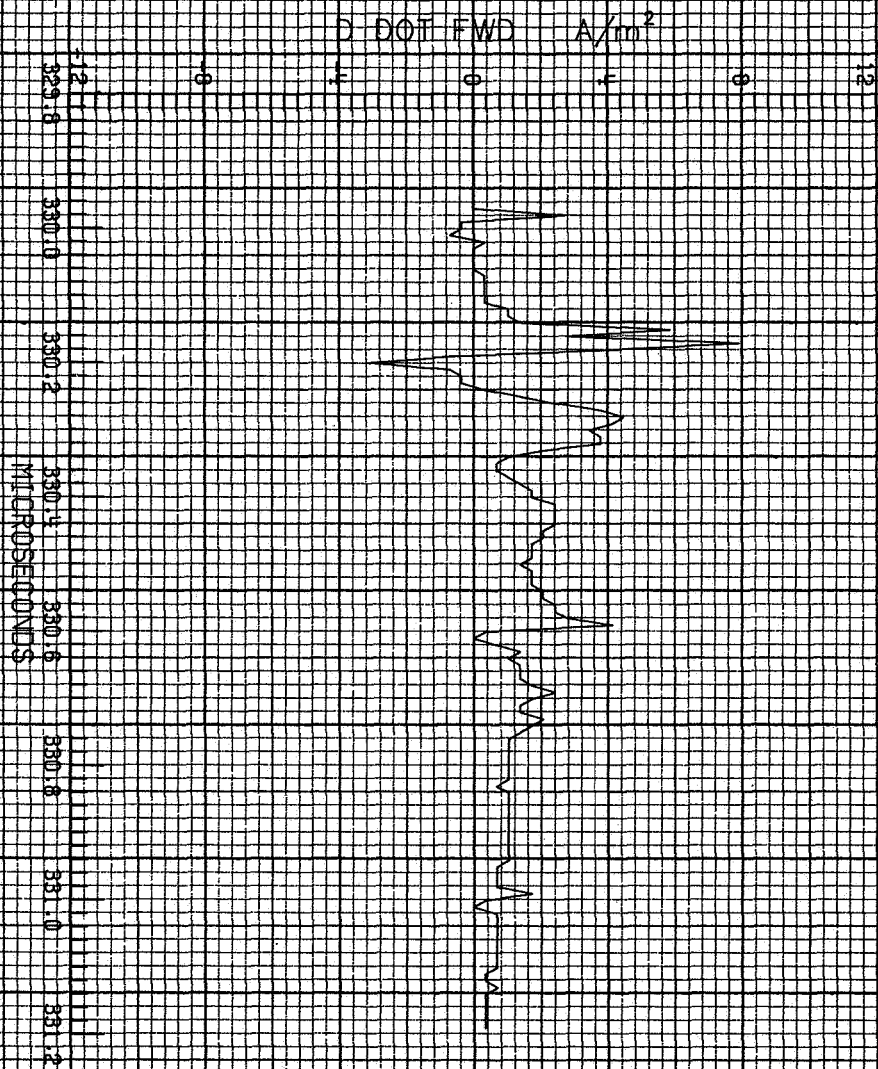


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F106 LIGHTNING/TK10/M.THOMAS

TEST NO. 040

RUN NO. 4

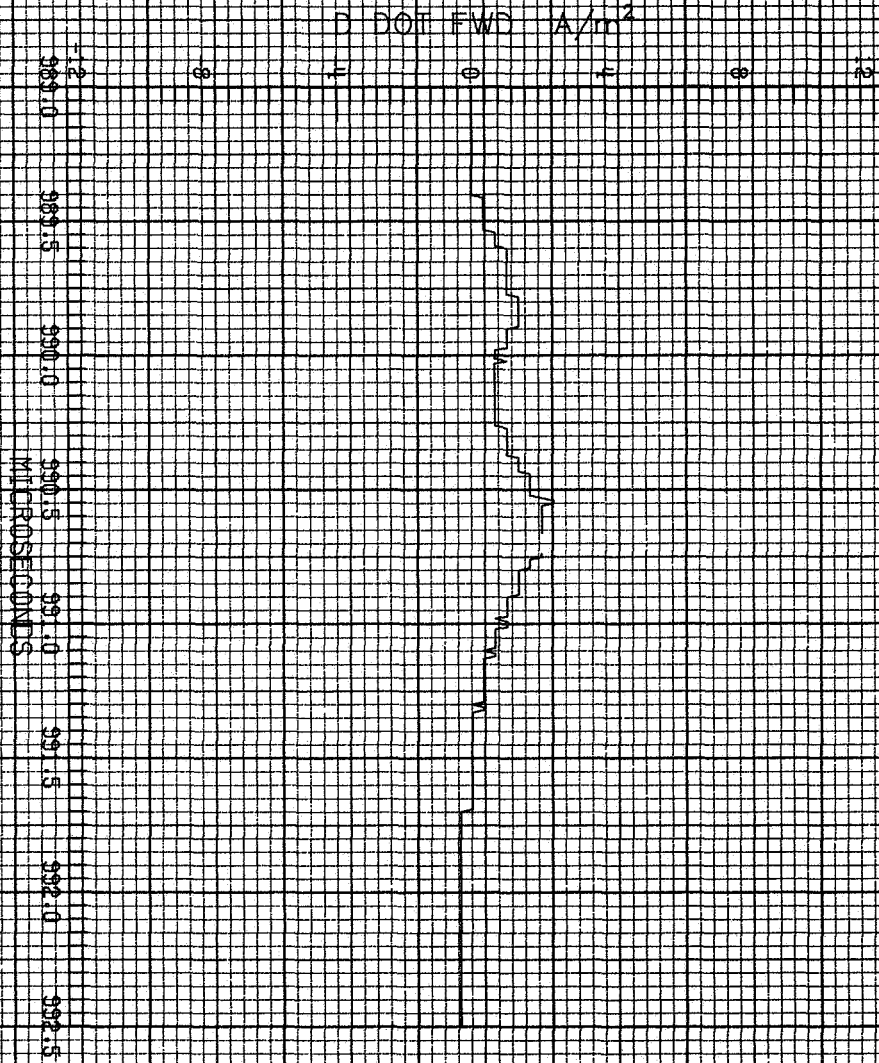


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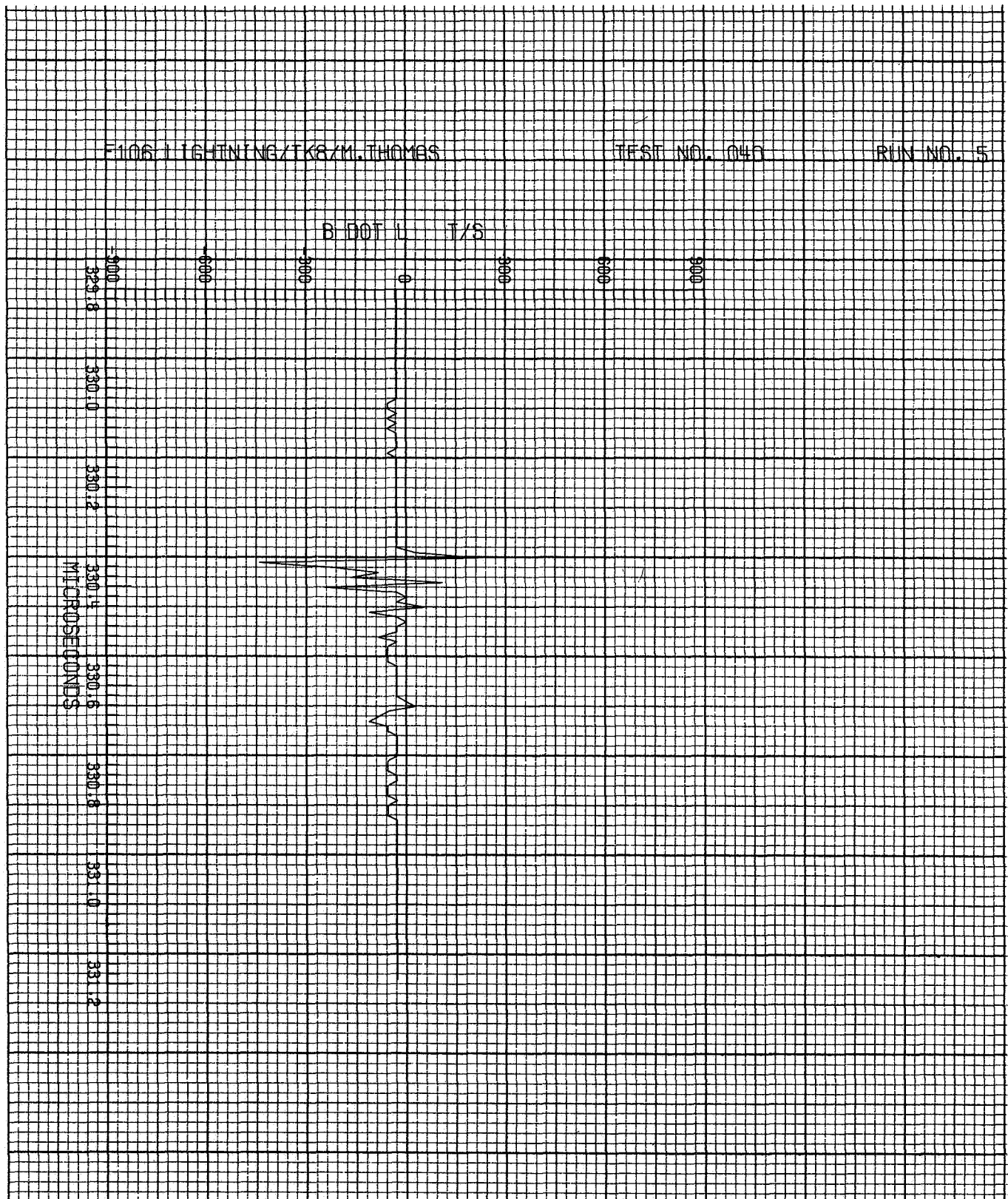
F106 LIGHTNING/TK10/M. THOMAS

TEST NO. 040

RUN NO. 4



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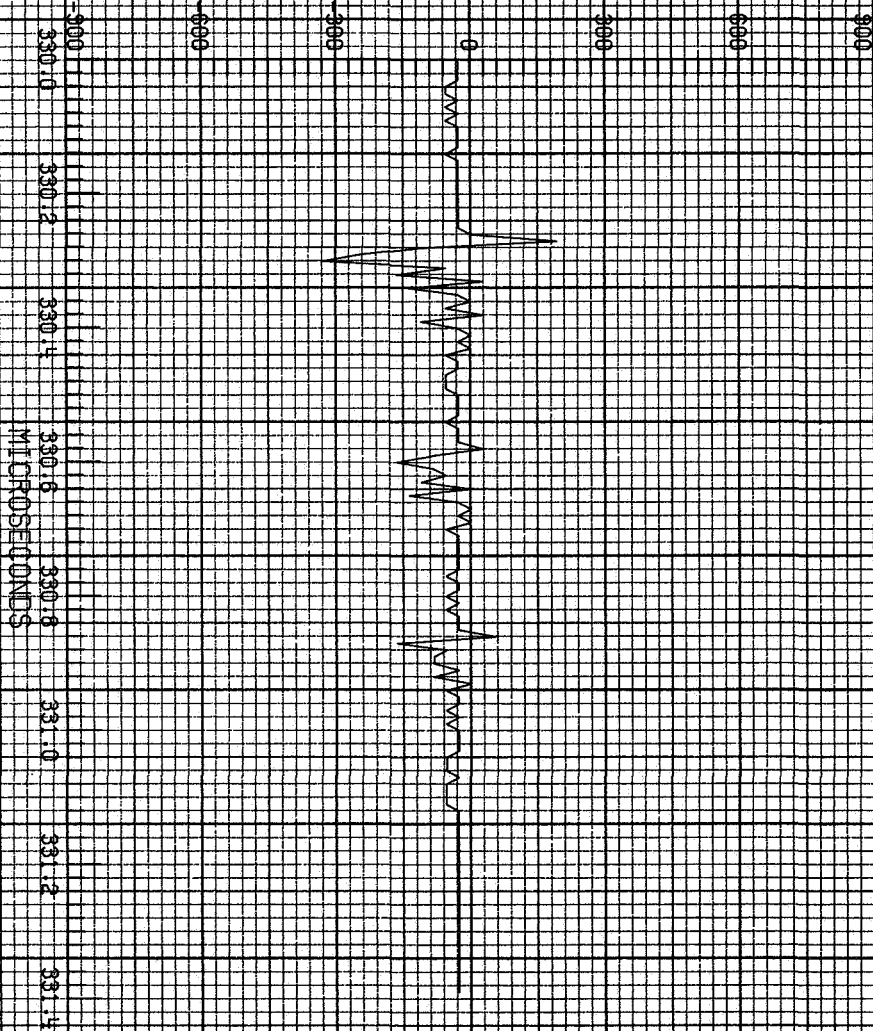
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E106 LIGHTNING/TK6/M.THOMAS

TEST NO. 040

RUN NO. 6

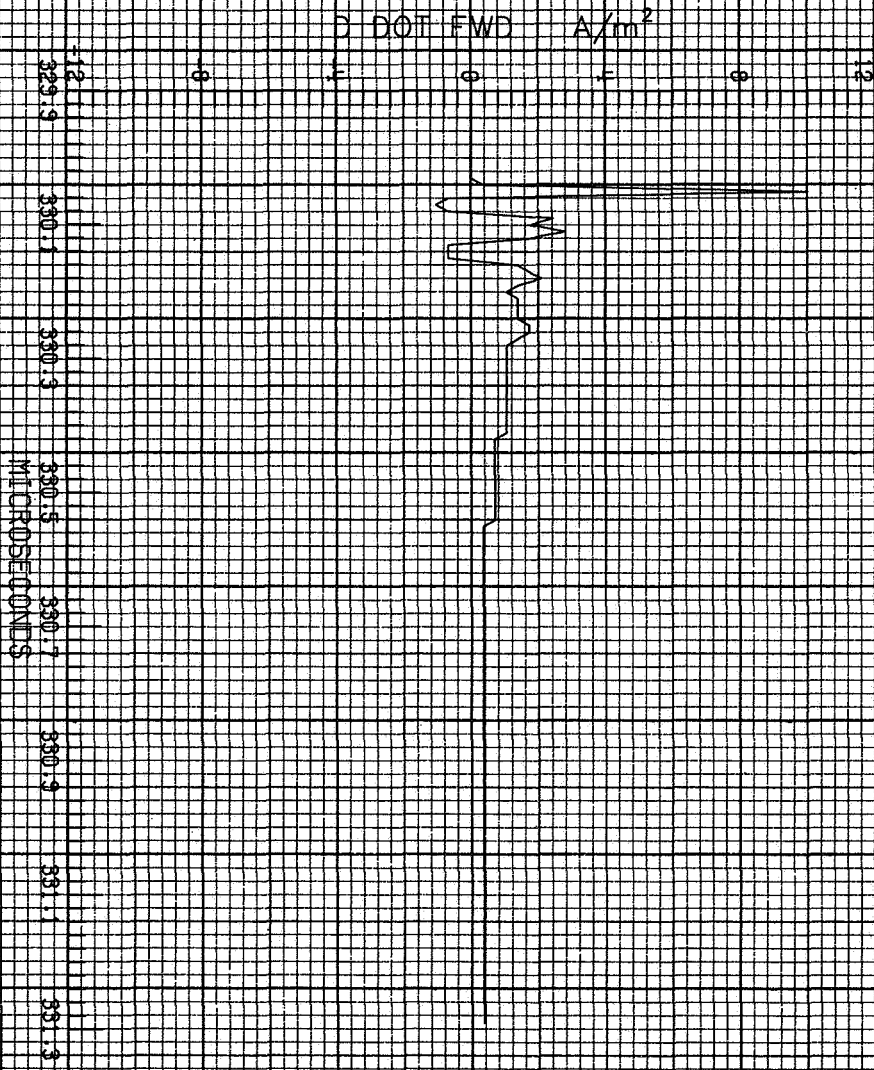
B DOT L T/S



F106 LIGHTNING/TK10/M. THOMAS

TEST NO. 040

RUN NO. 6

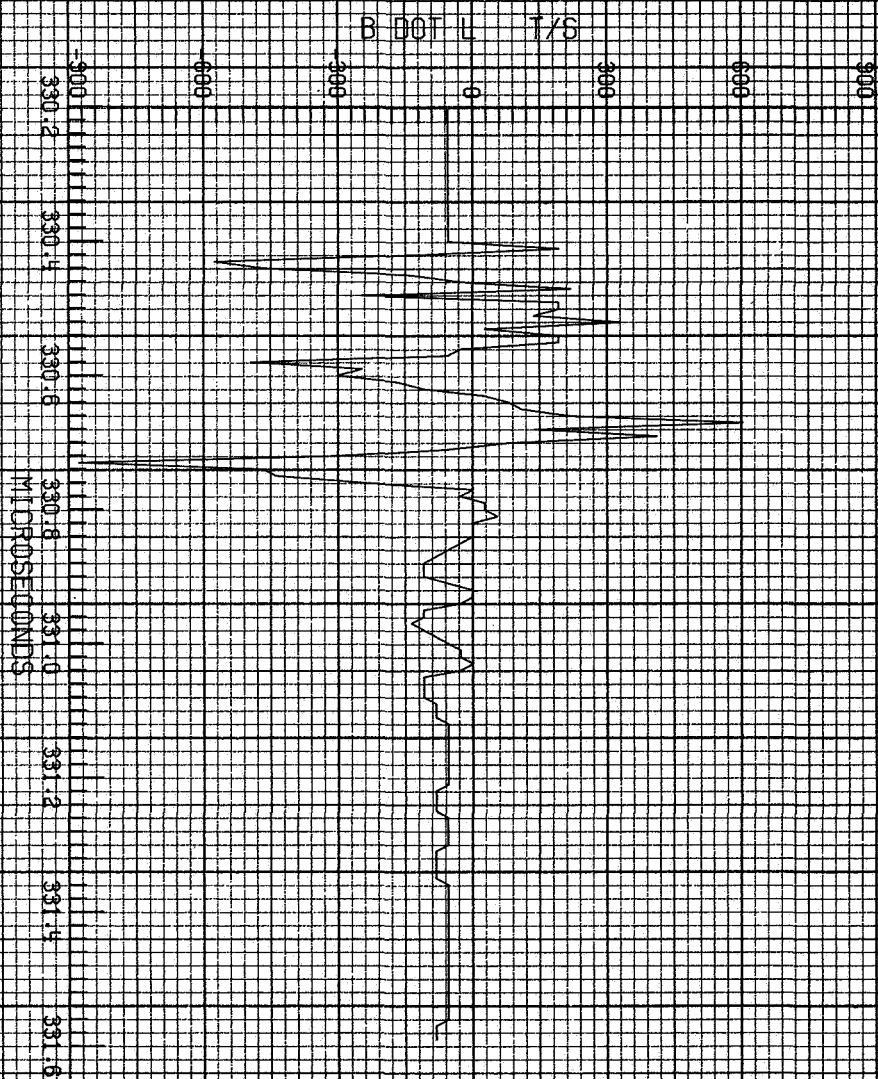


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F106 LIGHTNING/TK6/M.THOMAS

TEST NO. 040

RUN NO. 7

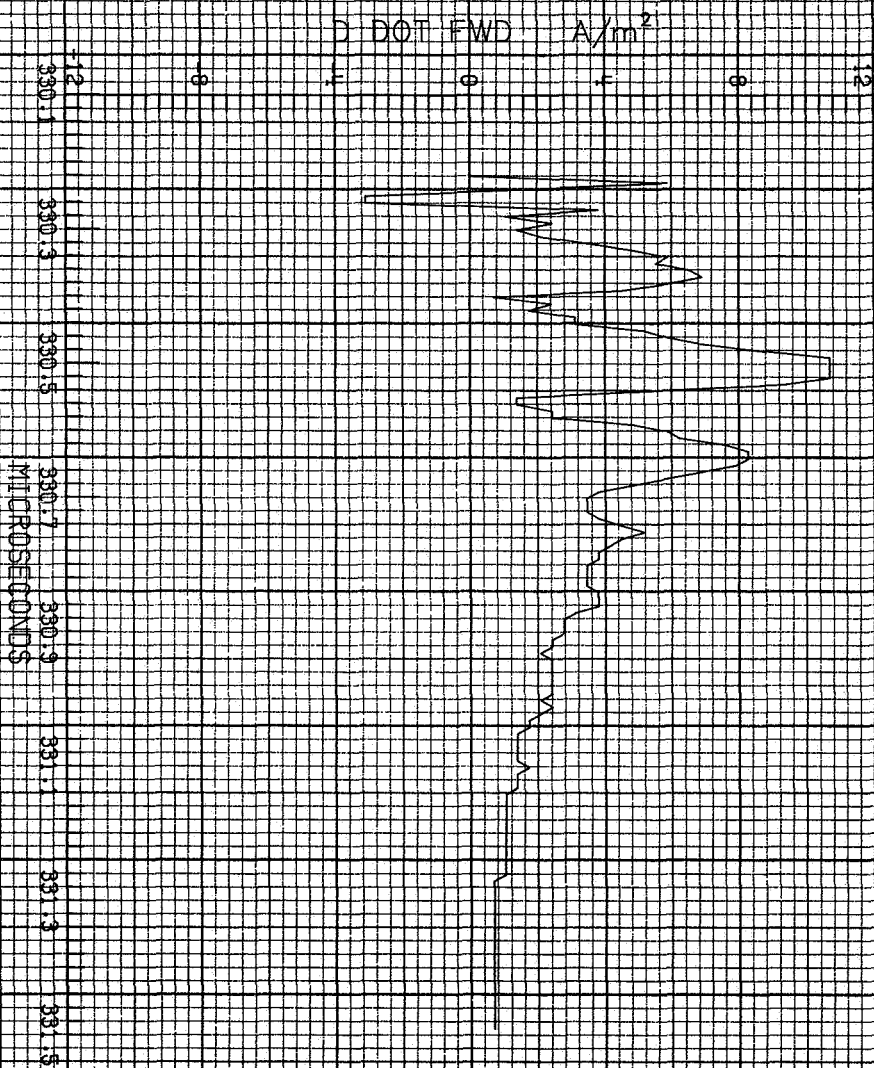


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F106 LIGHTNING/TK10/M. THOMAS

TEST NO. 040

RUN NO. 7



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F106 LIGHTNING/TK8/M. THOMES

TEST NO. 040

RUN NO. 8

B DOT L T/S

318.4
318.6
318.8
319.0
319.2
319.4
319.6
319.8
MICROSECONDS

000

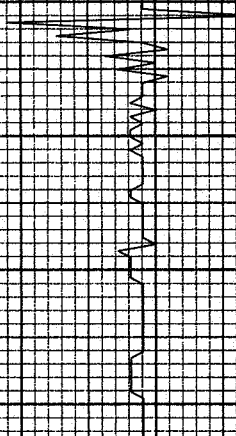
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000

000

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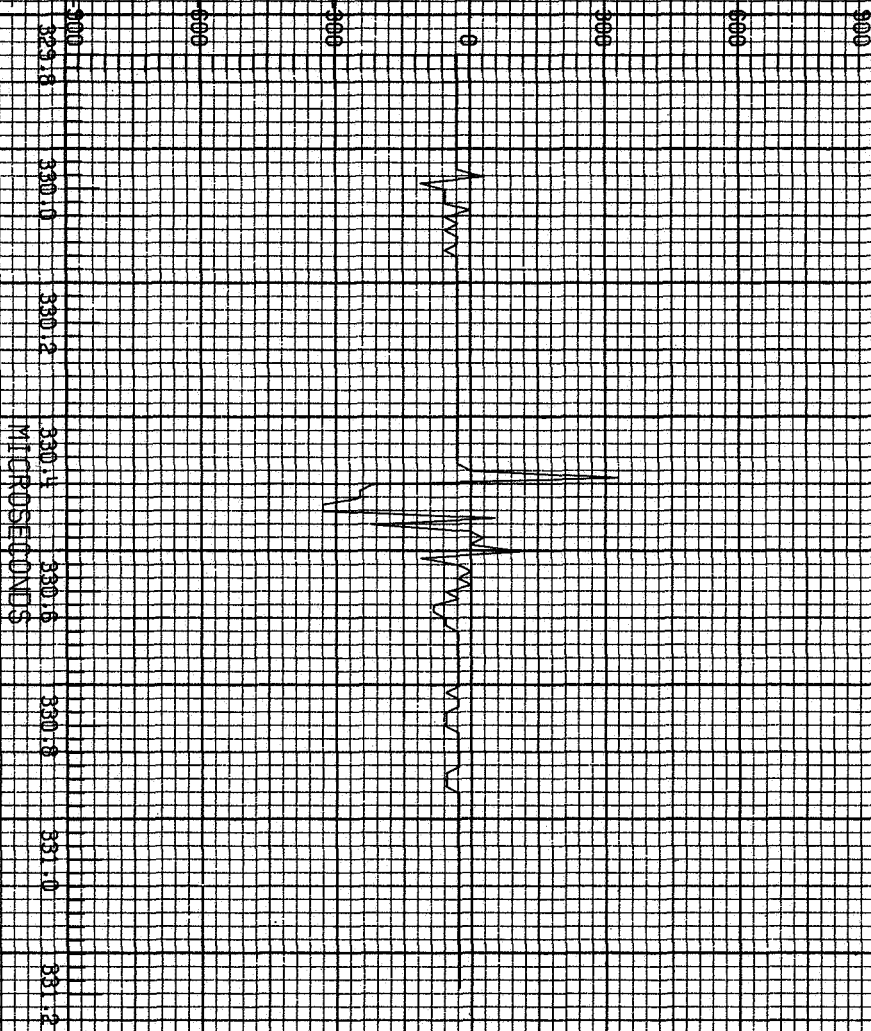


F106 LIGHTNING/TK6/M. THOMAS

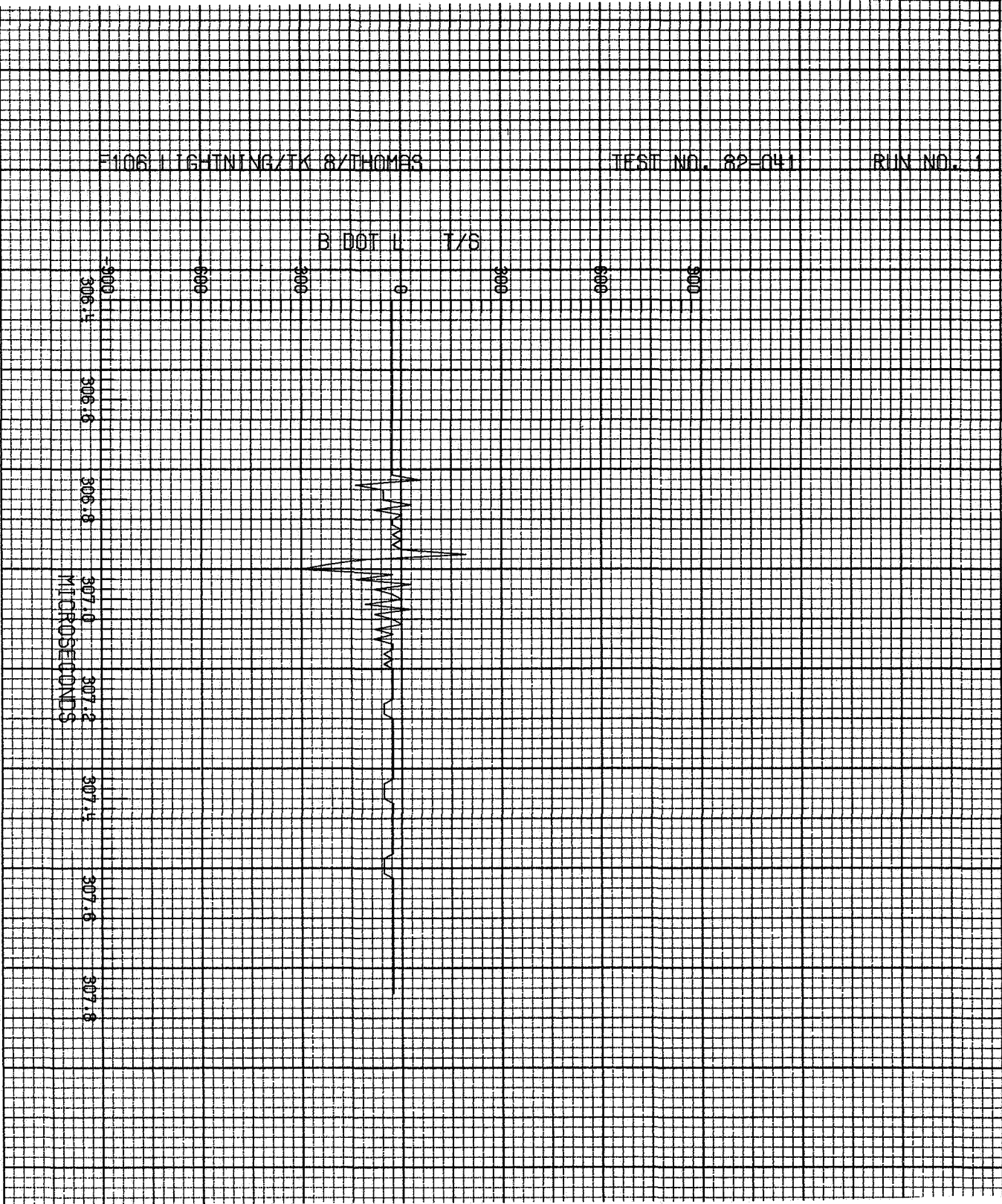
TEST NO. 040

RUN NO. 8

B DOT L T/S



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F106 LIGHTNING/TK 8/THOMBS

TEST NO. 82-041

RUN NO. 2

B DOT L T/S



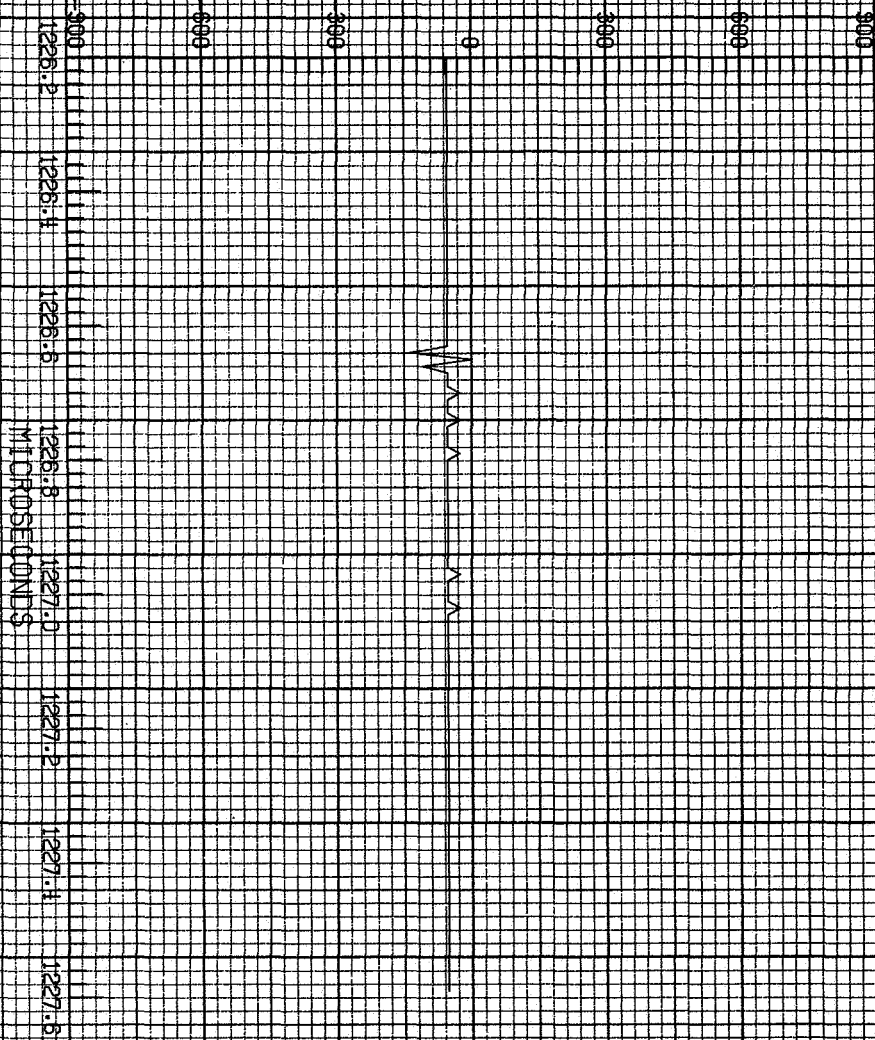
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F106 LIGHTNING/TK 8/THOMES

TEST NO. 82-G41

RUN NO. 2

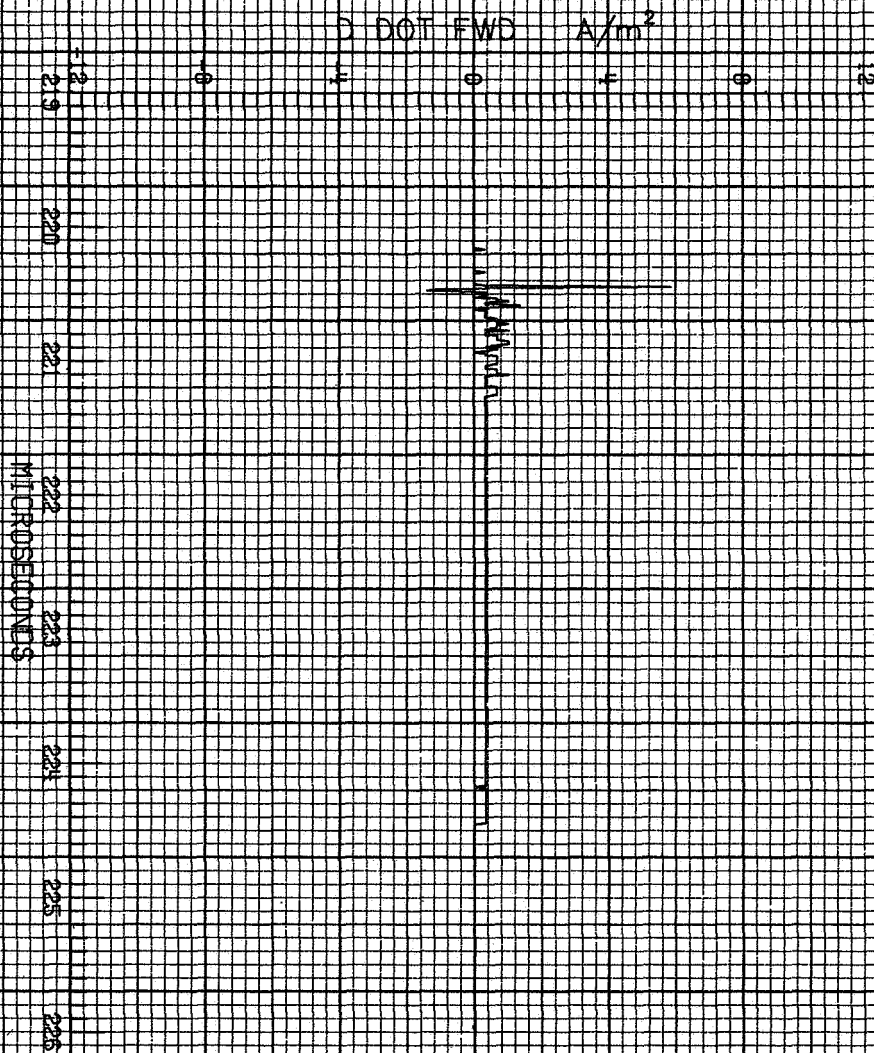
B DOT L T/S



F106 LIGHTNING/TK10/THOMAS

TEST NO. 82-041

RUN NO. 2

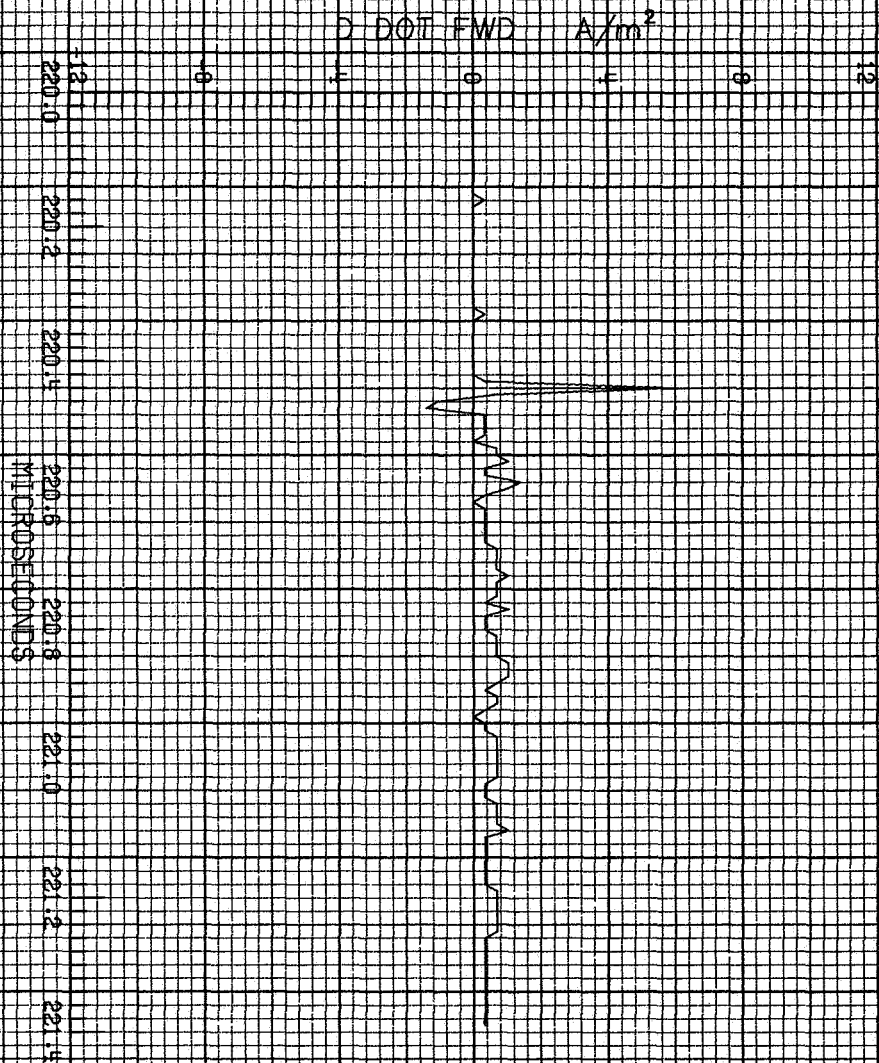


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F106 LIGHTNING/TK10/THOMBS

TEST NO. 82-041

RUN NO. 2

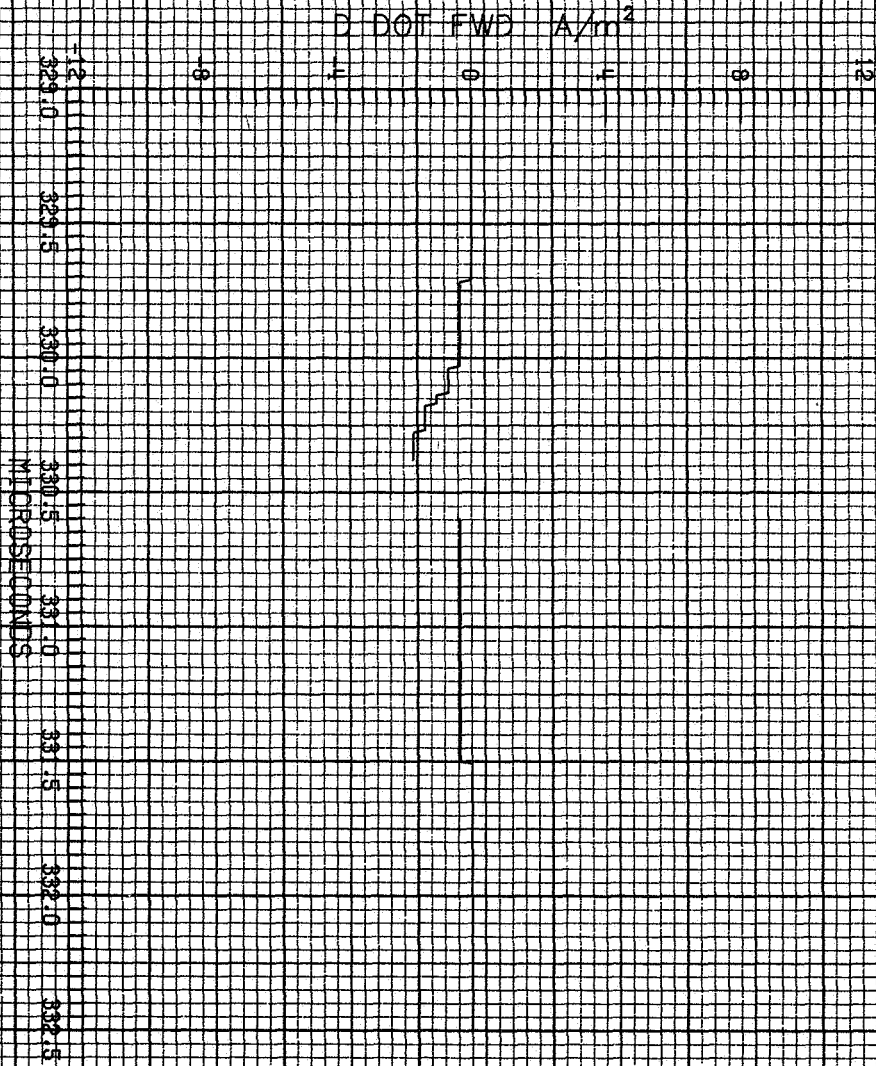


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F106 LIGHTNING/TK10/THOMAS

TEST NO. 82-041

RUN NO. 3



F106 LIGHTNING/TK10/THOMAS

TEST NO. 82-041

RUN NO. 3

DOT FWD A/m^2

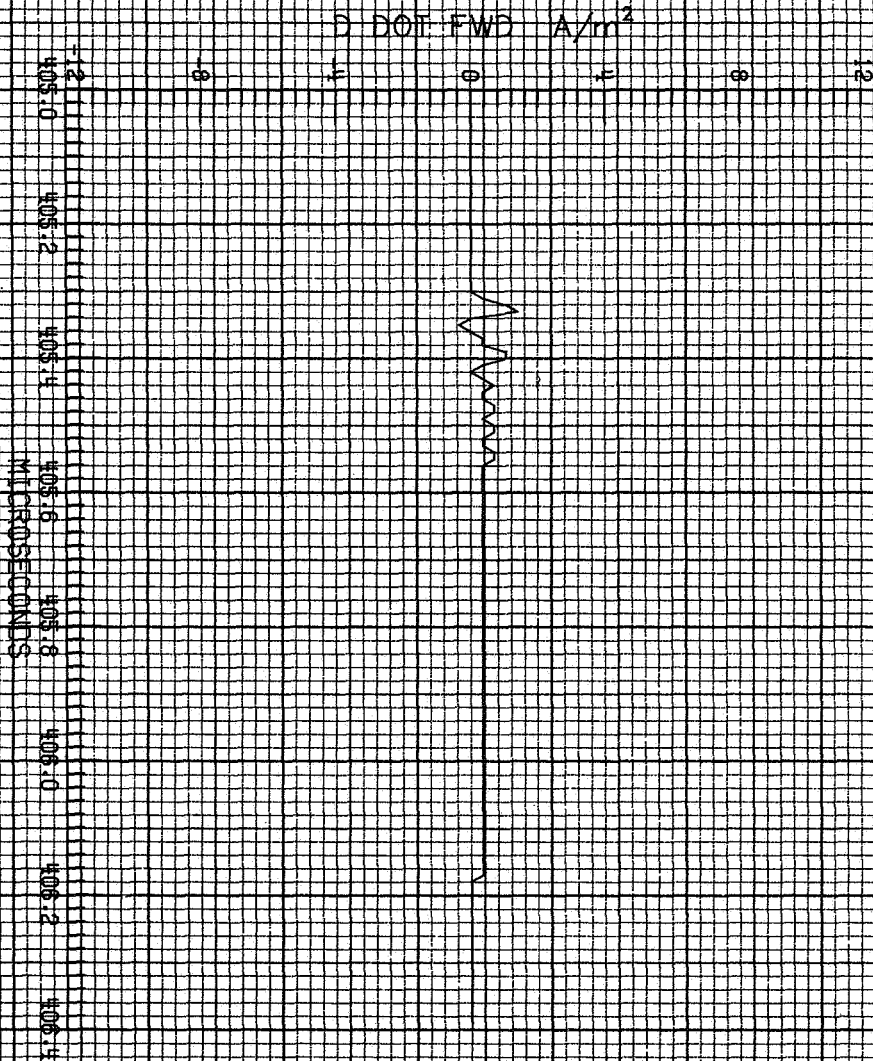
2
345.0
345.2
345.4
345.6
345.8
346.0
346.2
346.4
MICROSECONDS

1

F106 LIGHTNING/TK10/THOMBS

TEST NO. 82-041

RUN NO. 3



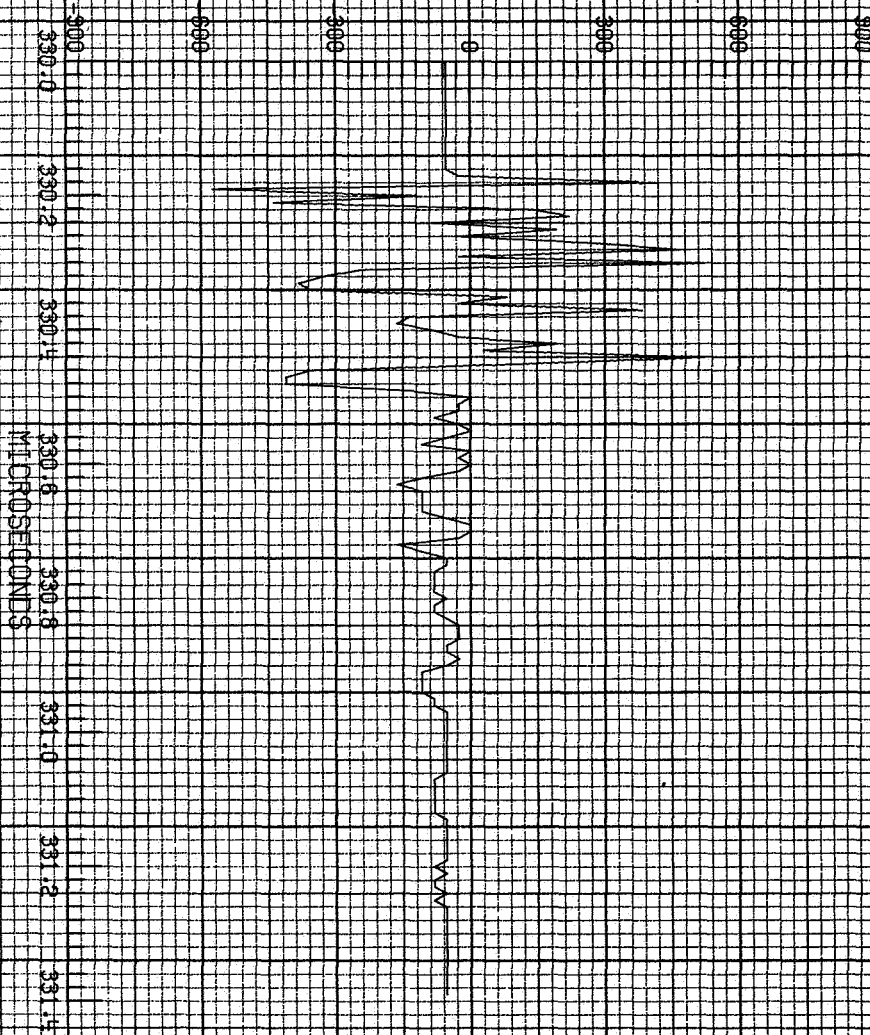
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F106 LIGHTNING/TK 8/THOMES

TEST NO. 82-041

RUN NO. 4

B DOT L T/S

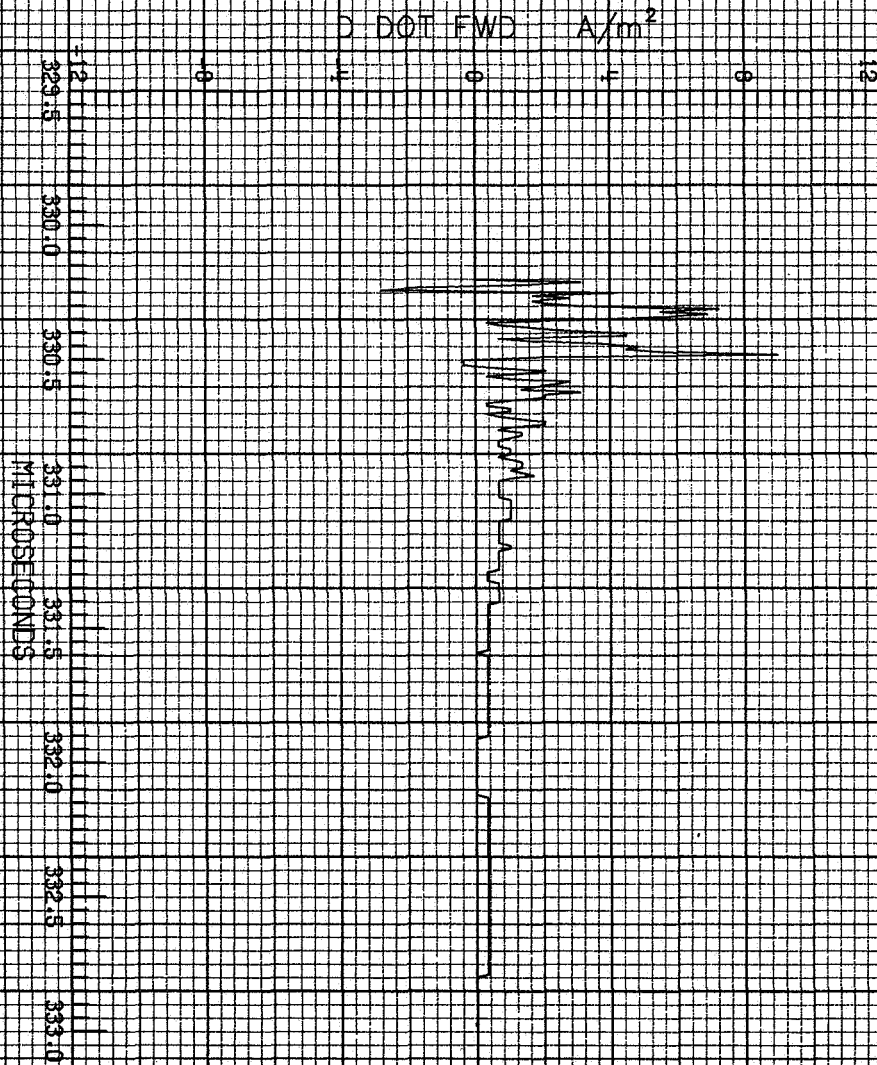


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F106 LIGHTNING/TK10/THOMBS

TEST NO. 82-041

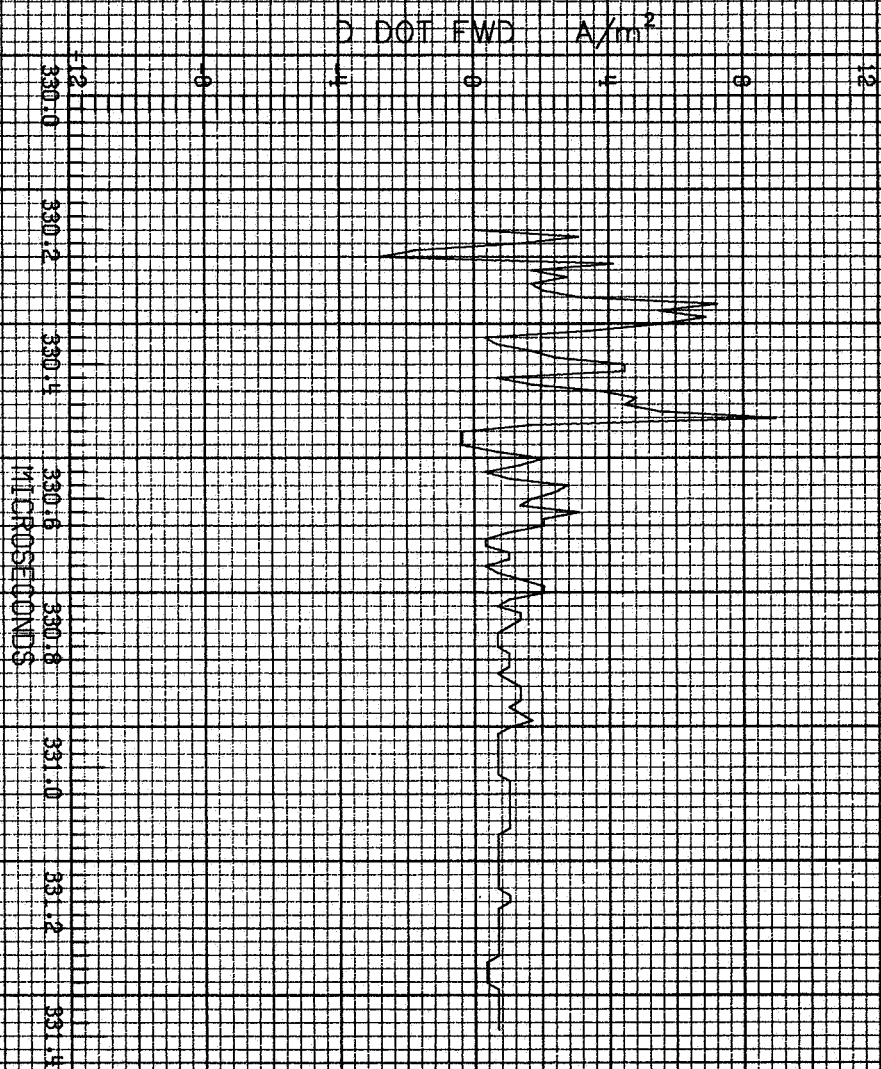
RUN NO. 4



F106 LIGHTNING/TK10/THOMBS

TEST NO. 82-041

RUN NO. 4



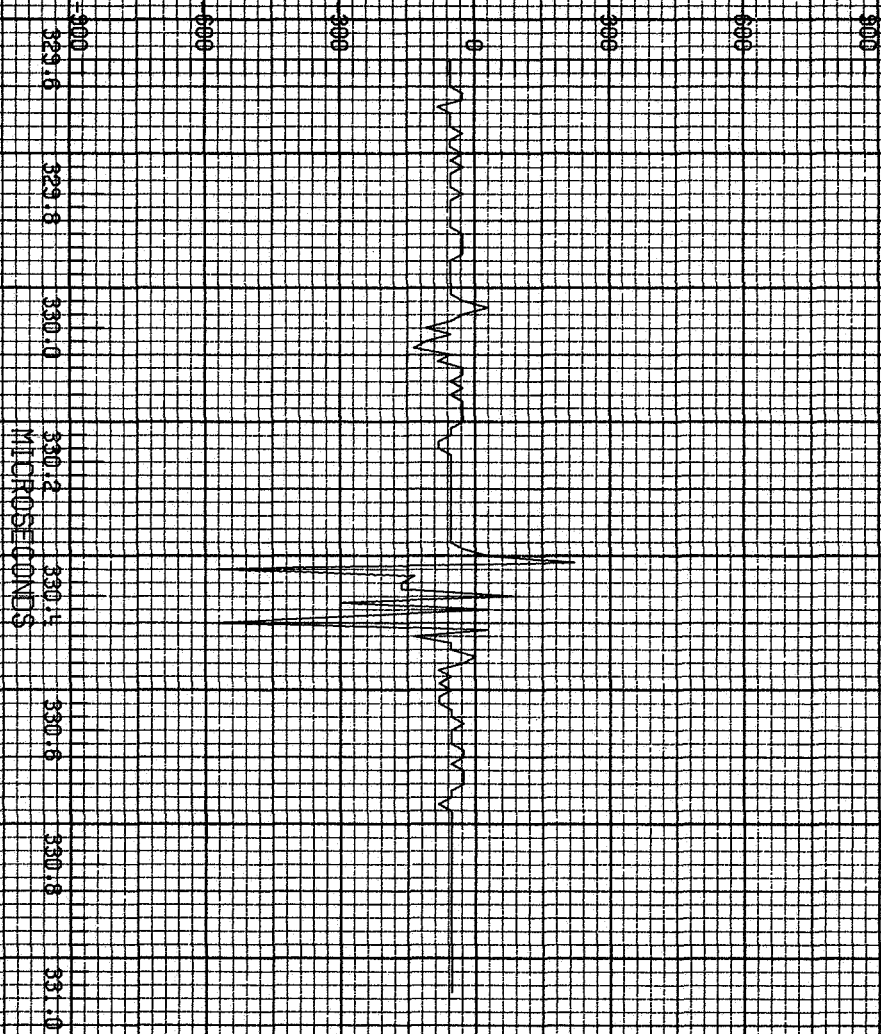
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F106 LIGHTNING/TK 8/THOMAS

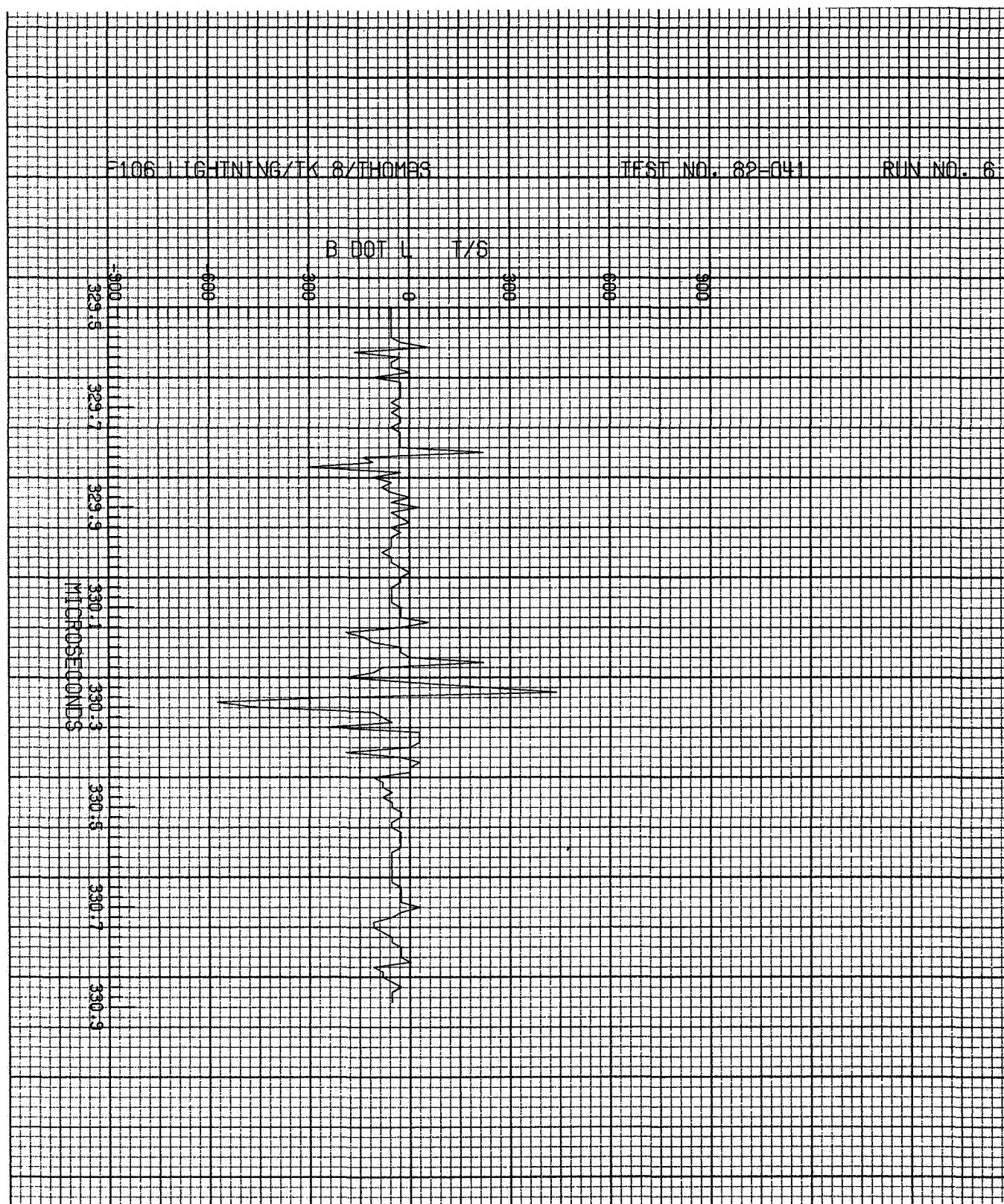
TEST NO. 82-041

RUN NO. 5

B DOT L T/S



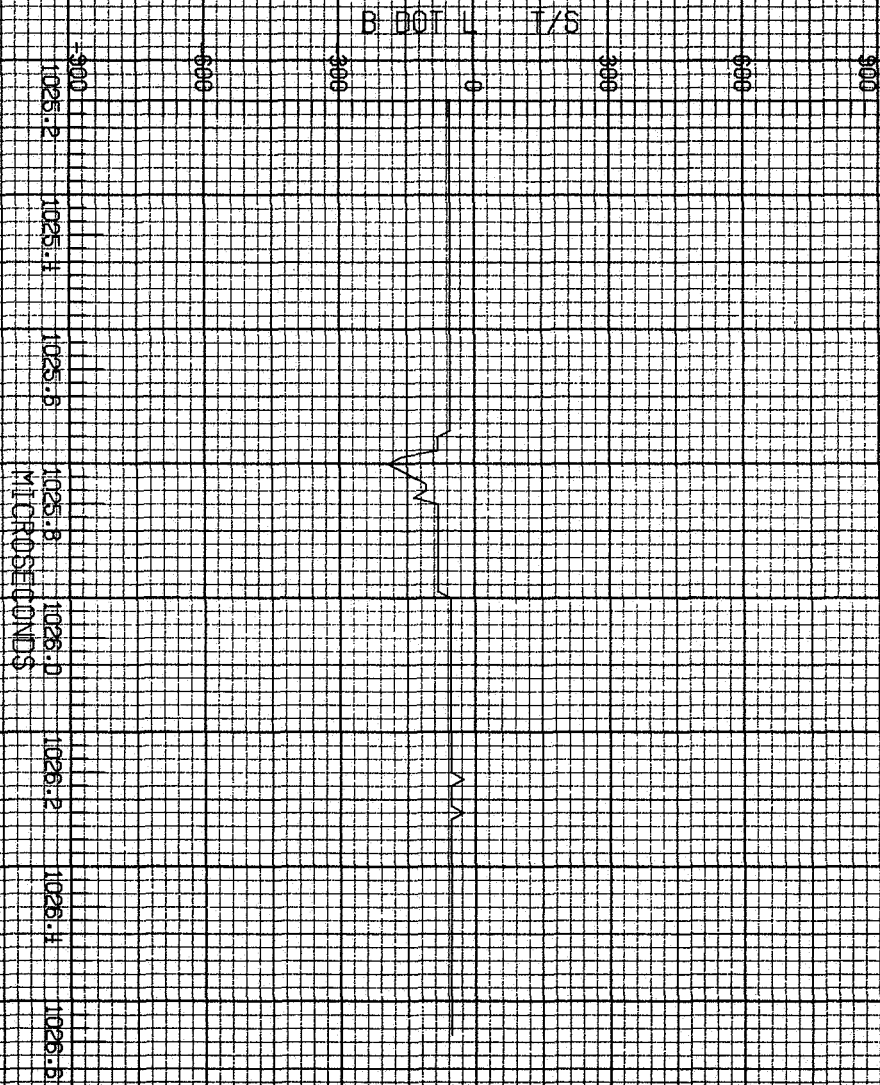
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F106 LIGHTNING/TK 8/THOMBS

TEST NO. 82-041

RUN NO. 6

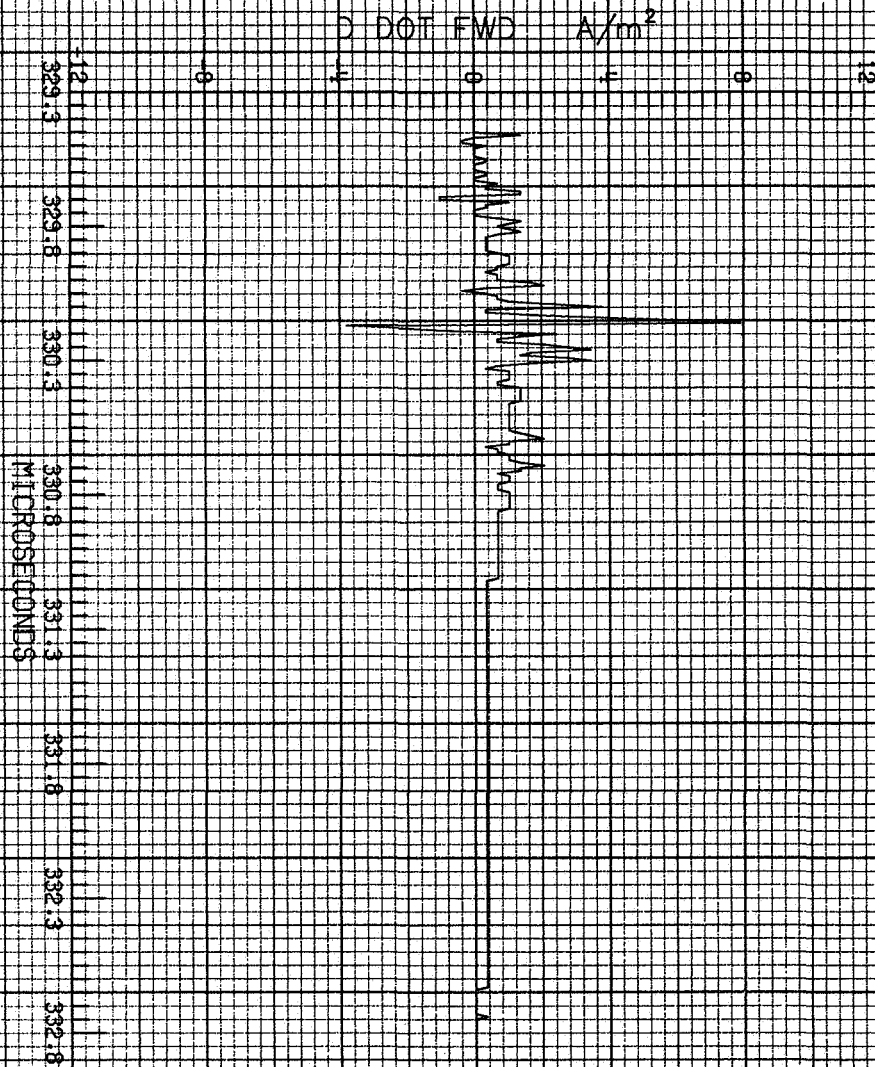


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F106 LIGHTNING/TK10/THOMAS

TEST NO. 82-041

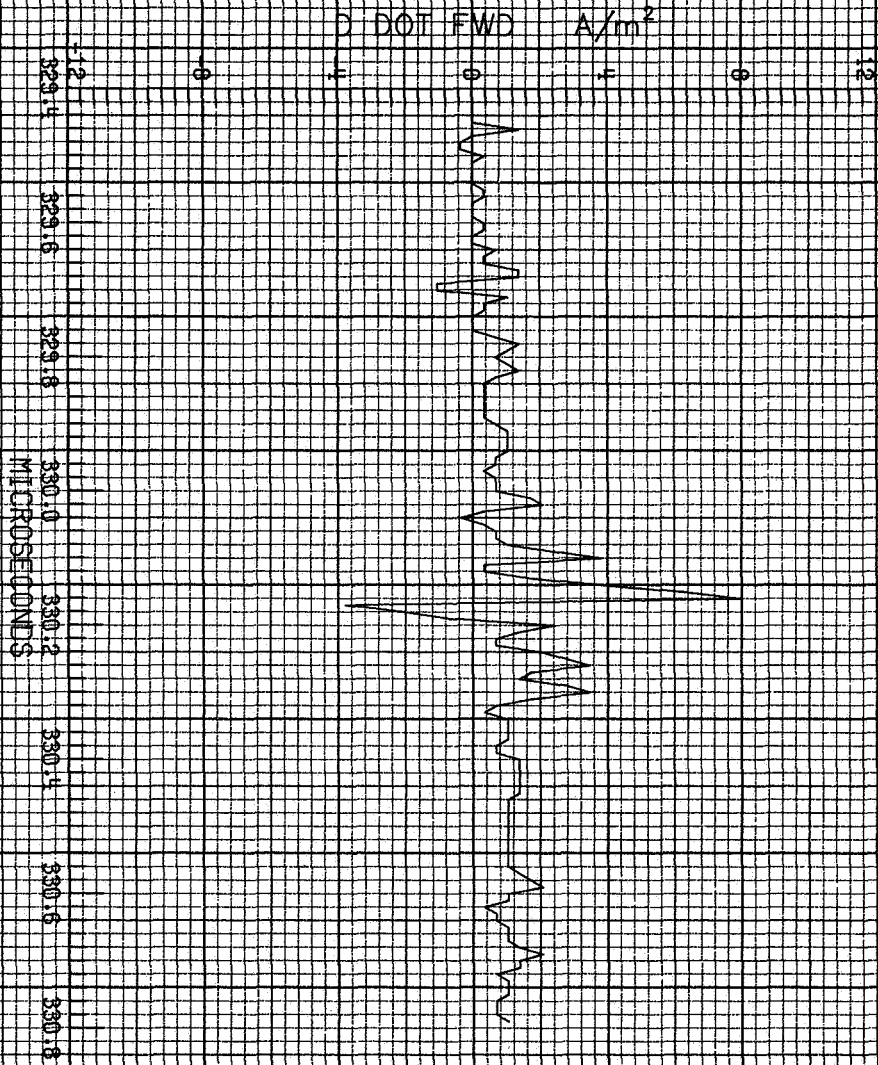
RUN NO. 6



F106 LIGHTNING/TK10/THOMPS

TEST NO. 82-041

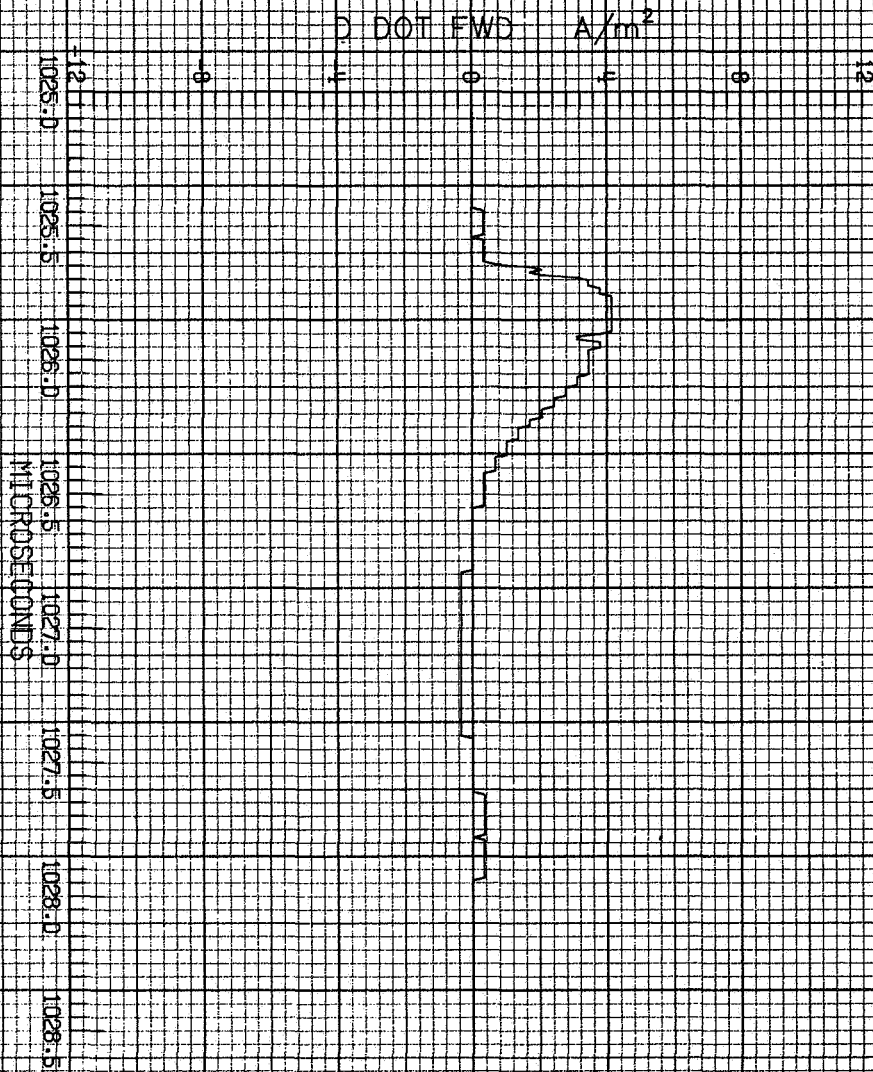
RUN NO. 6



F106 LIGHTNING/TK10/THOMBS

TEST NO. 82-041

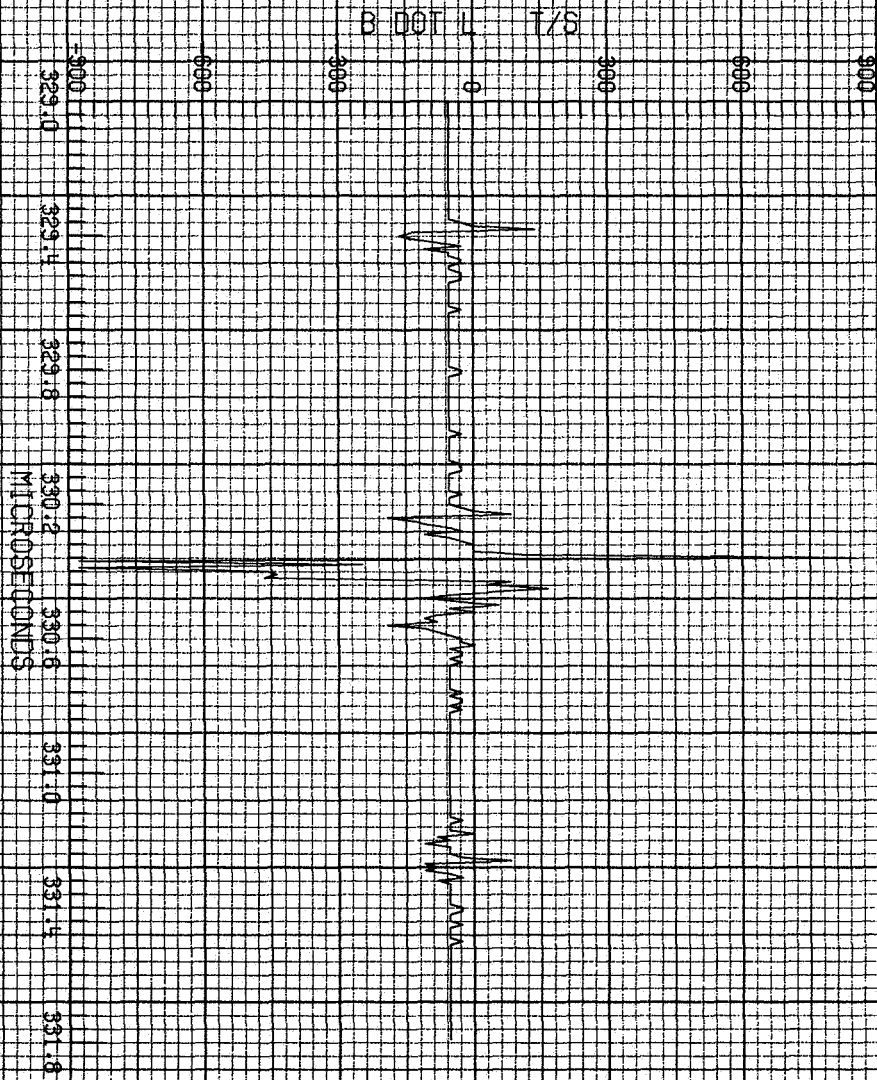
RUN NO. 6



F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-041

RUN NO. 7

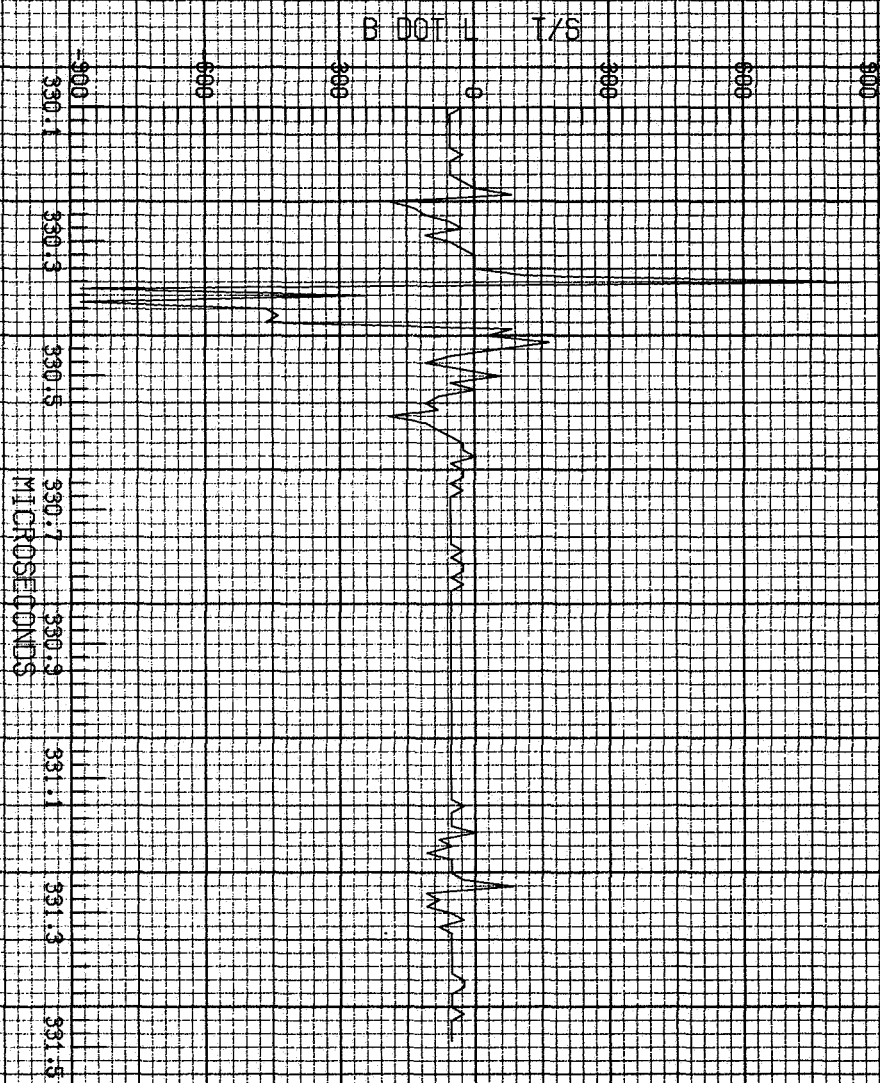


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F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-041

RUN NO. 7

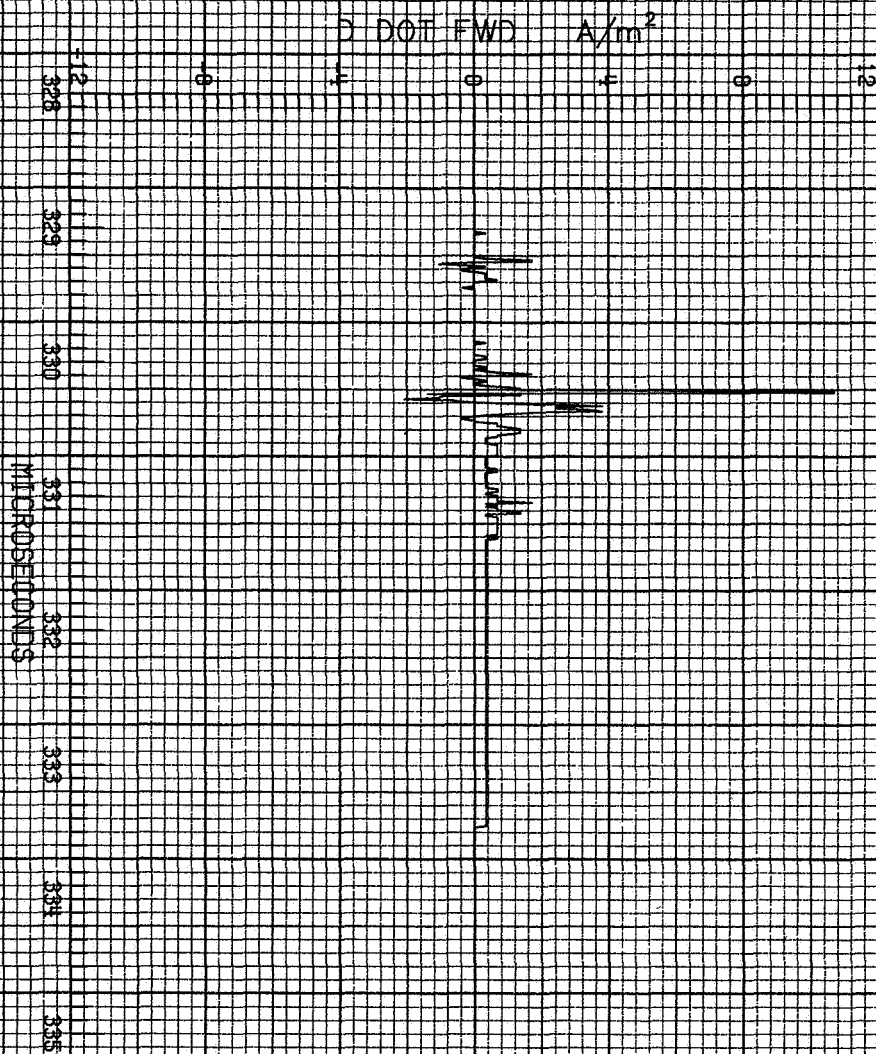


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F106 LIGHTNING/TK10/THOMES

TEST NO. 82-041

RUN NO. 7

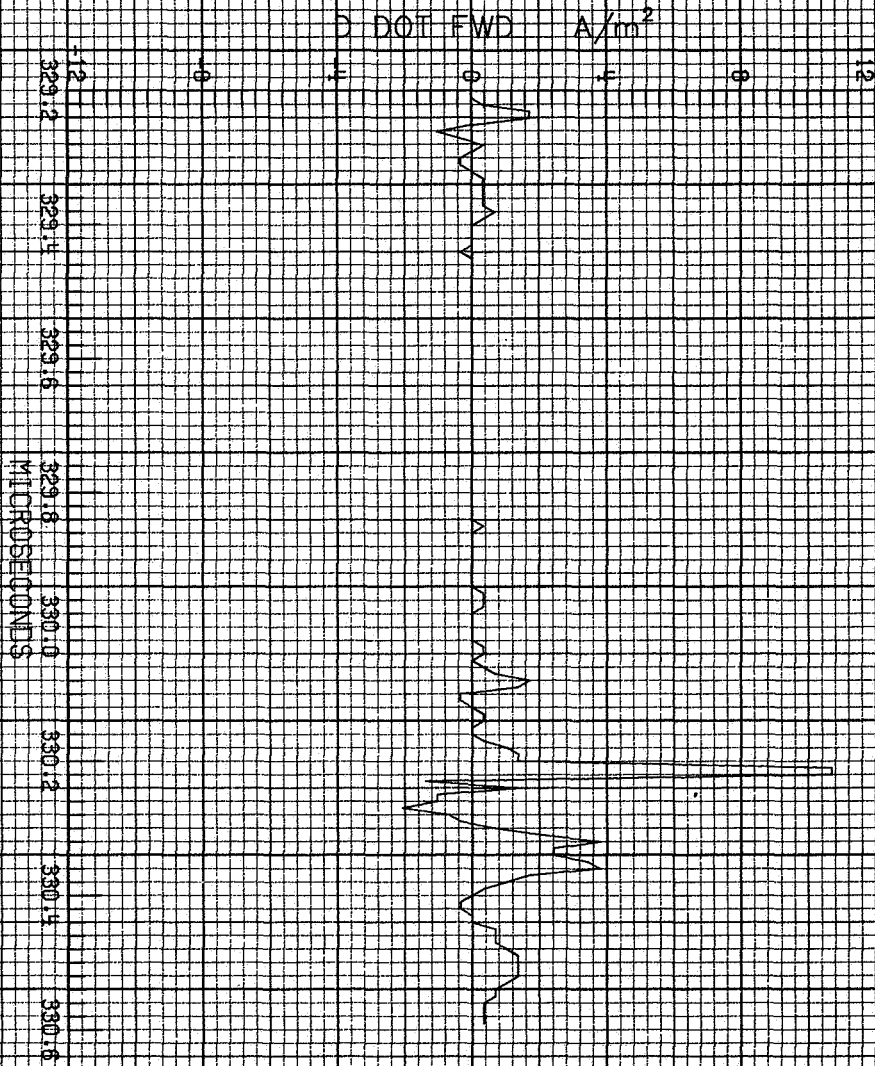


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F106 LIGHTNING/TK10/THOMBS

TEST NO. 82-041

RUN NO. 7



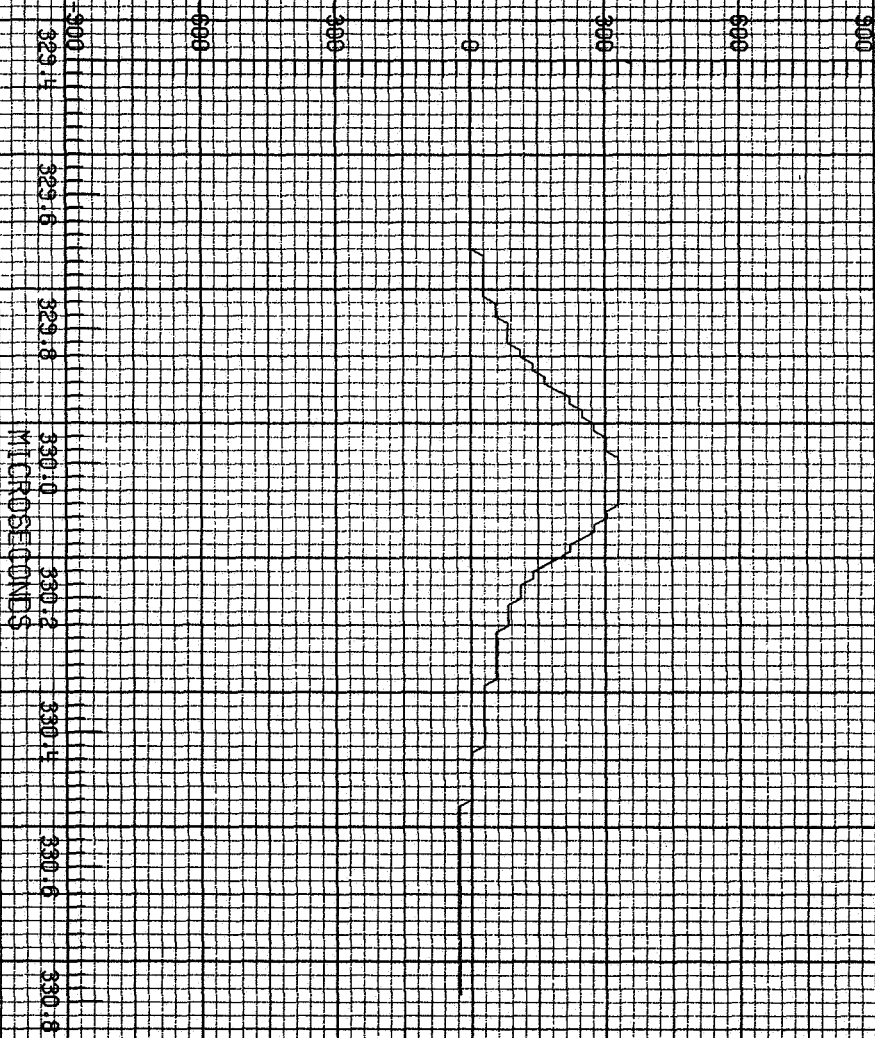
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F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-041

RUN NO. 8

B DOT L T/S

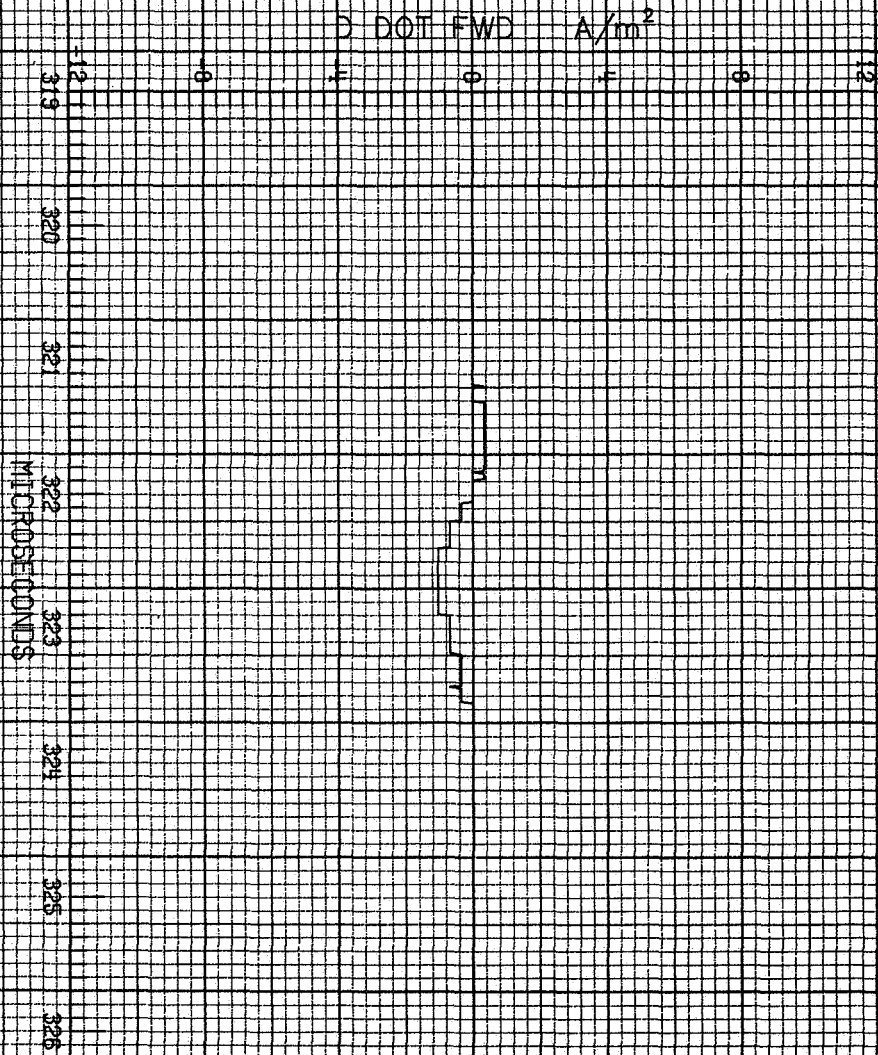


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F106 LIGHTNING/FK10/THOMAS

TEST NO. 82-041

RUN NO. 8

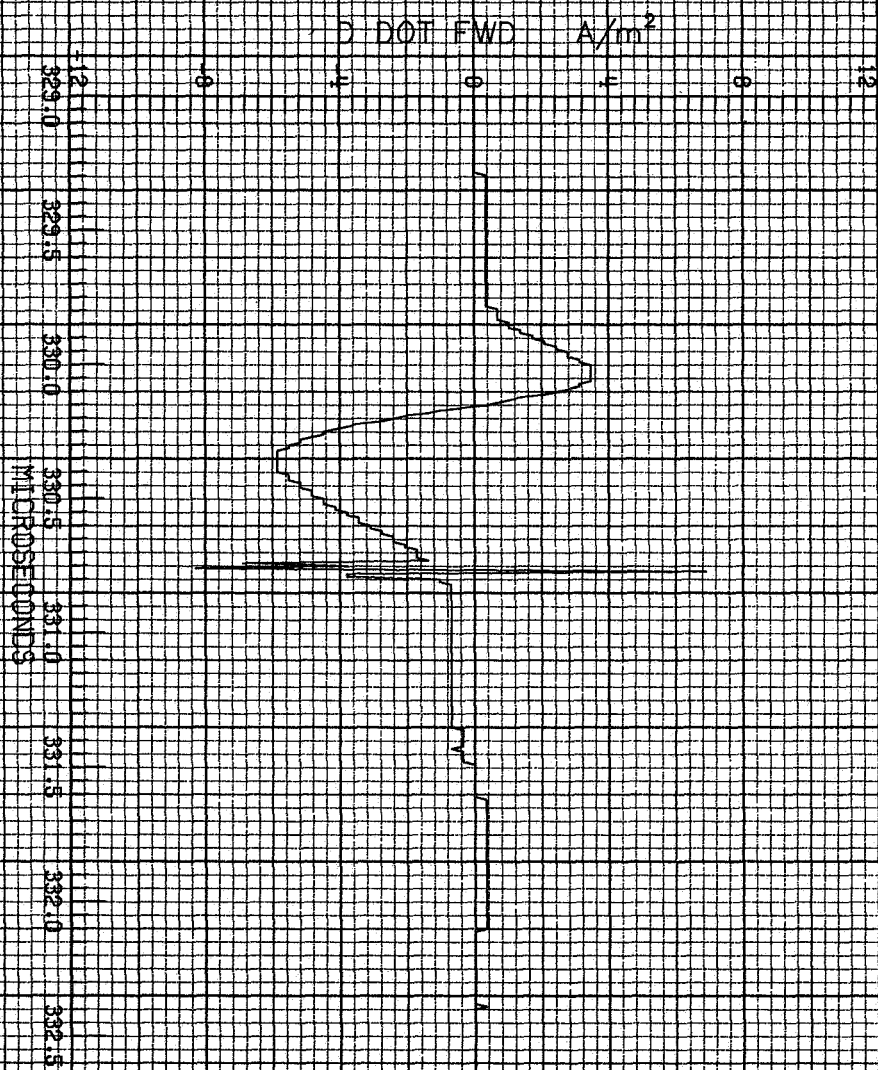


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F106 LIGHTNING/TK10/THOMAS

TEST NO. 82-041

RUN NO. 8

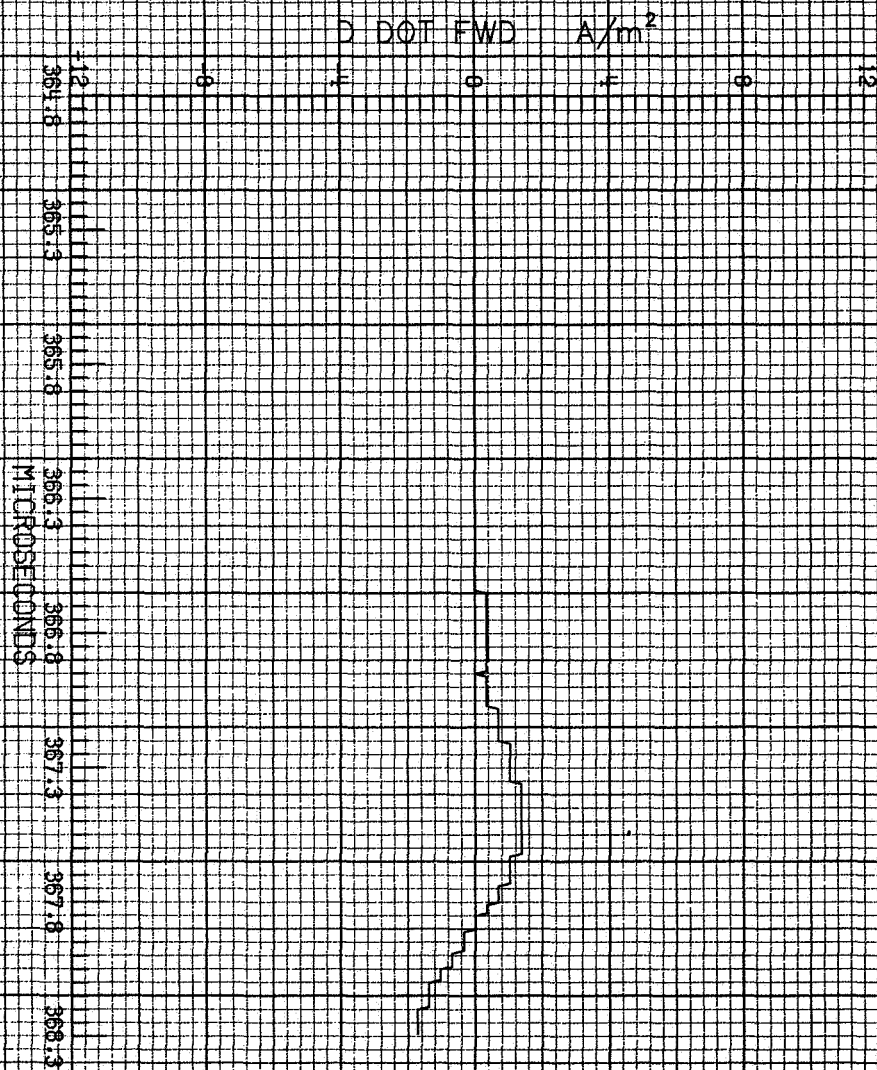


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F106 LIGHTNING/TK10/THOMBS

TEST NO. 82-041

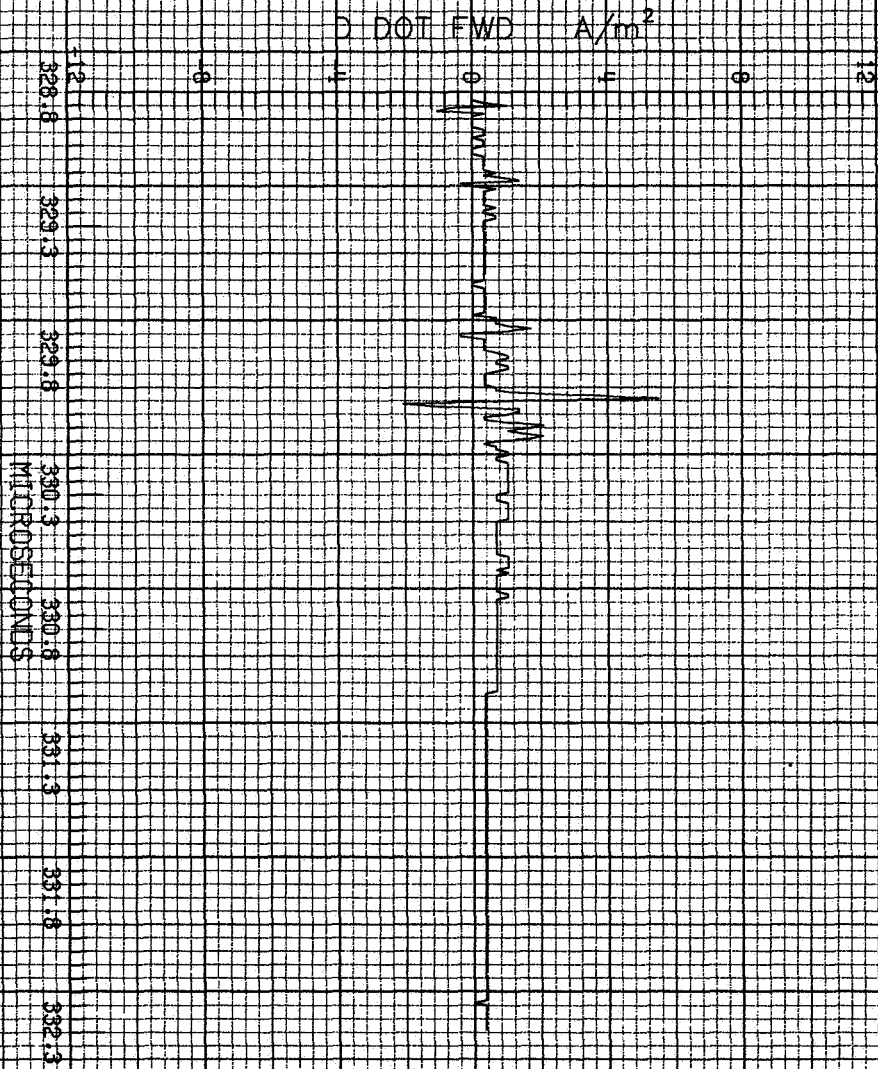
RUN NO. 8



F106 LIGHTNING/TK10/THOMBS

TEST NO. 82-641

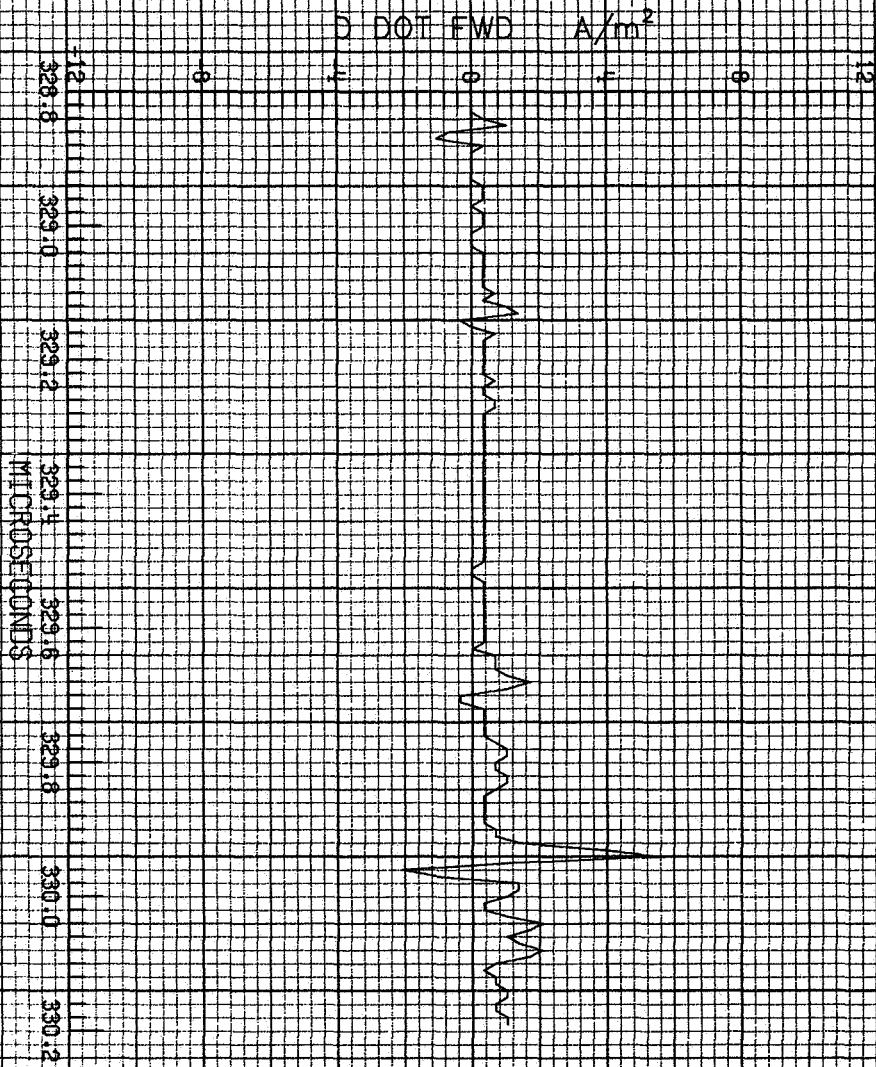
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F106 LIGHTNING/TK10/THOMBS

TEST NO. 82-041

RUN NO. 3

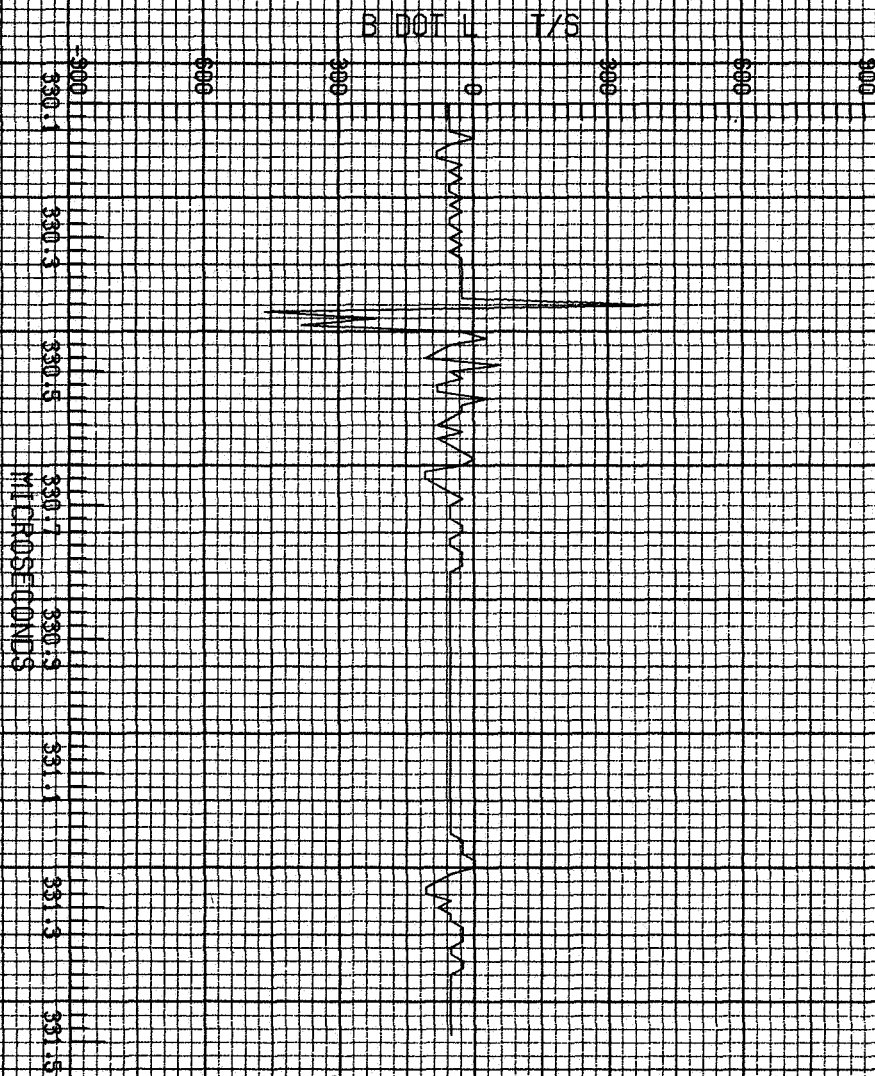


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F106 LIGHTNING/TK 8/THOMBS

TEST NO. 82-041

RUN NO. 10



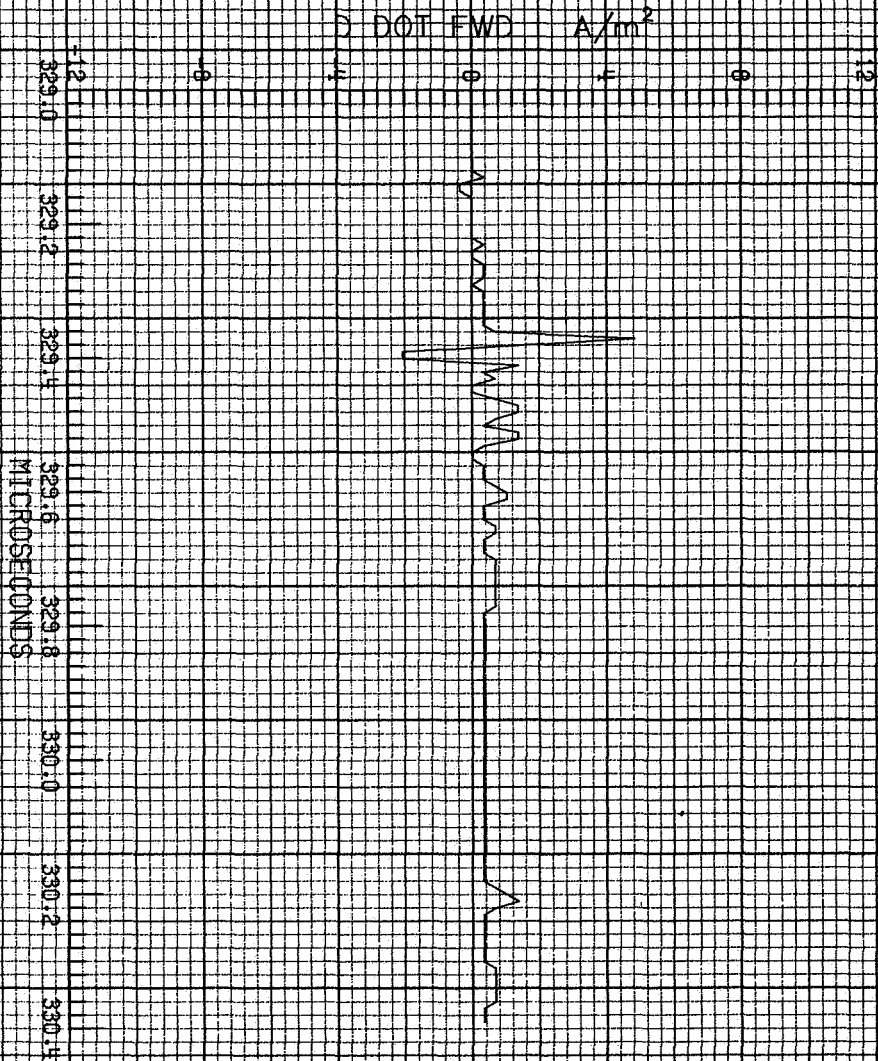
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F106 LIGHTNING/TK10/THOMBS

TEST NO. 82-041

RUN NO. 10



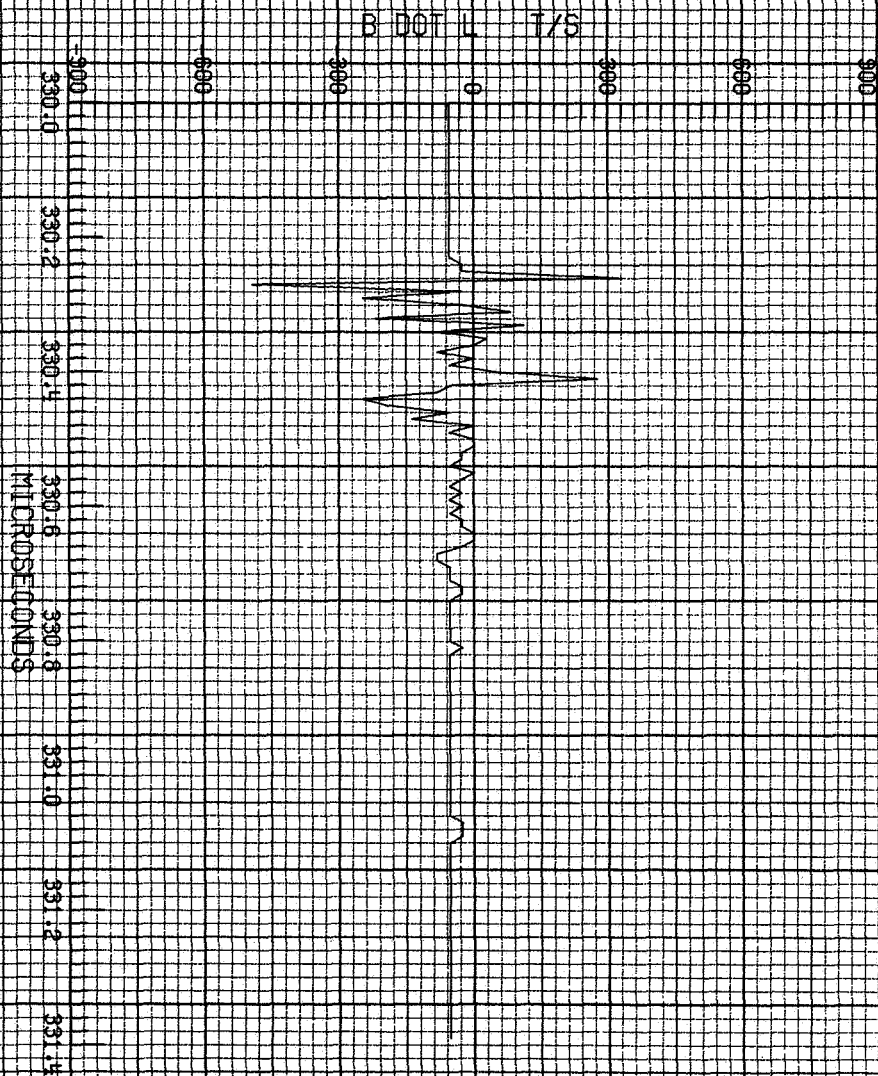
C-5

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F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-041

RUN NO. 11

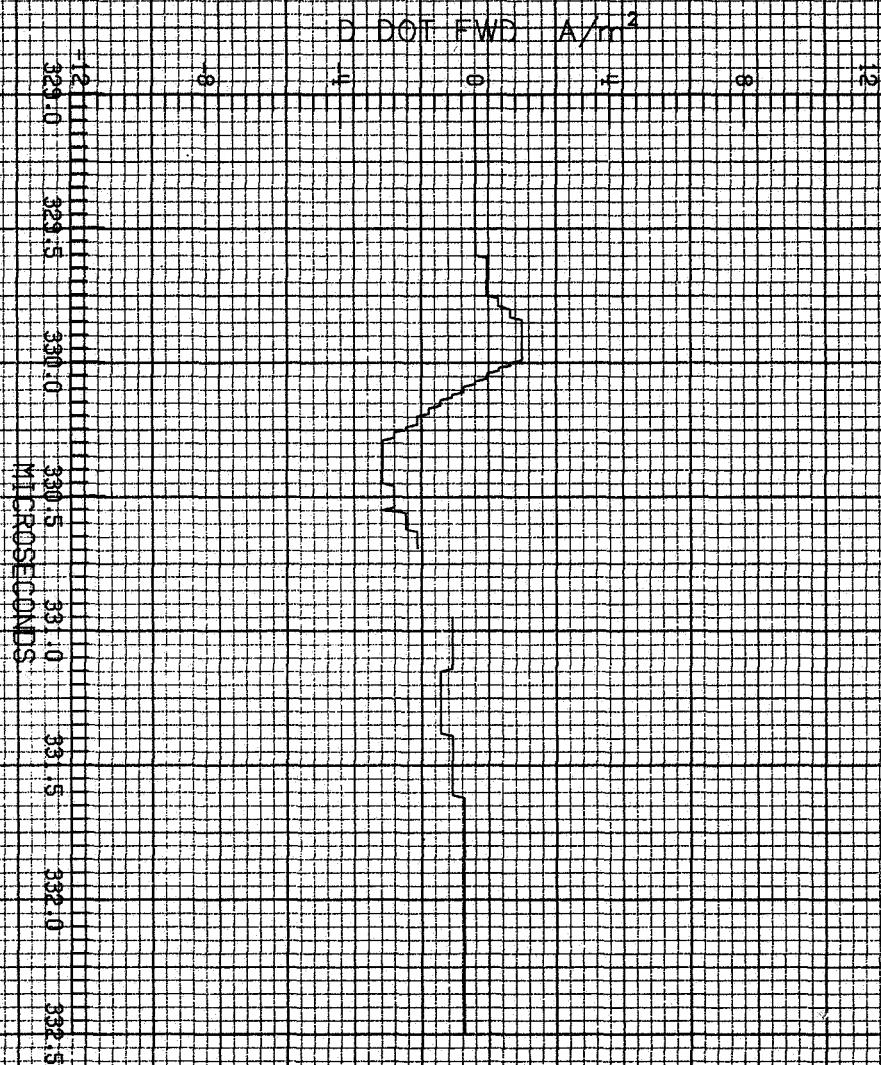


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F106 LIGHTNING/TK10/THOMAS

TEST NO. 82-041

RUN NO. 11

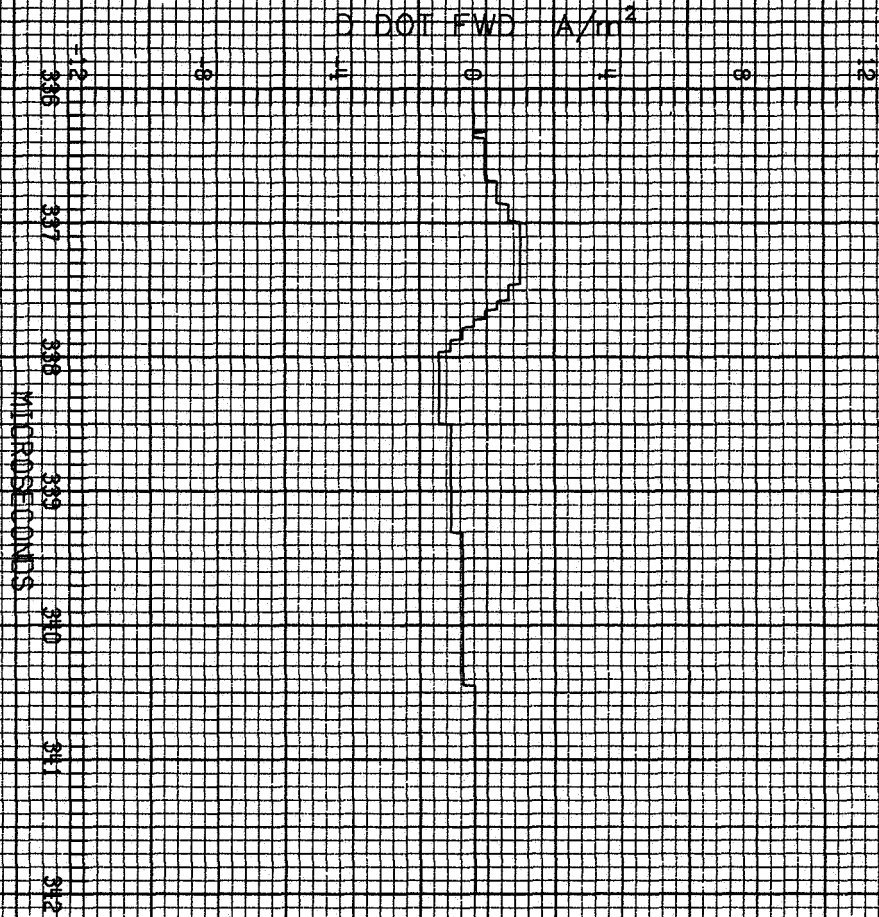


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F106 LIGHTNING/FK10/THOMAS

TEST NO. 82-041

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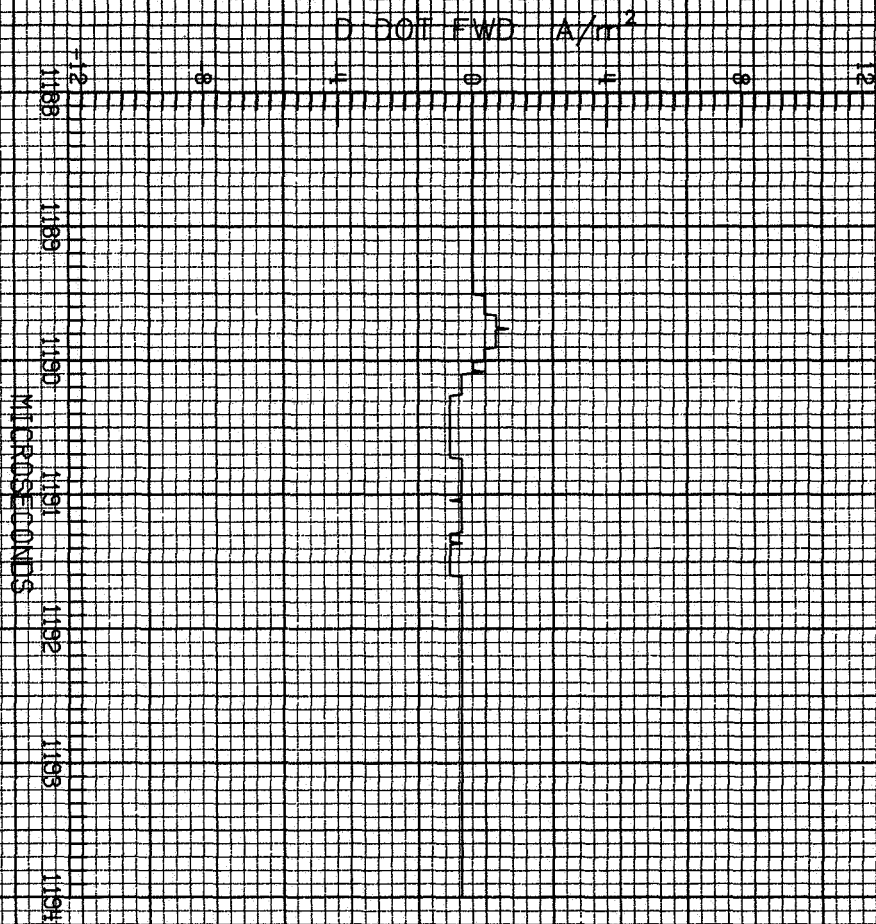


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TEST NO. 82-041

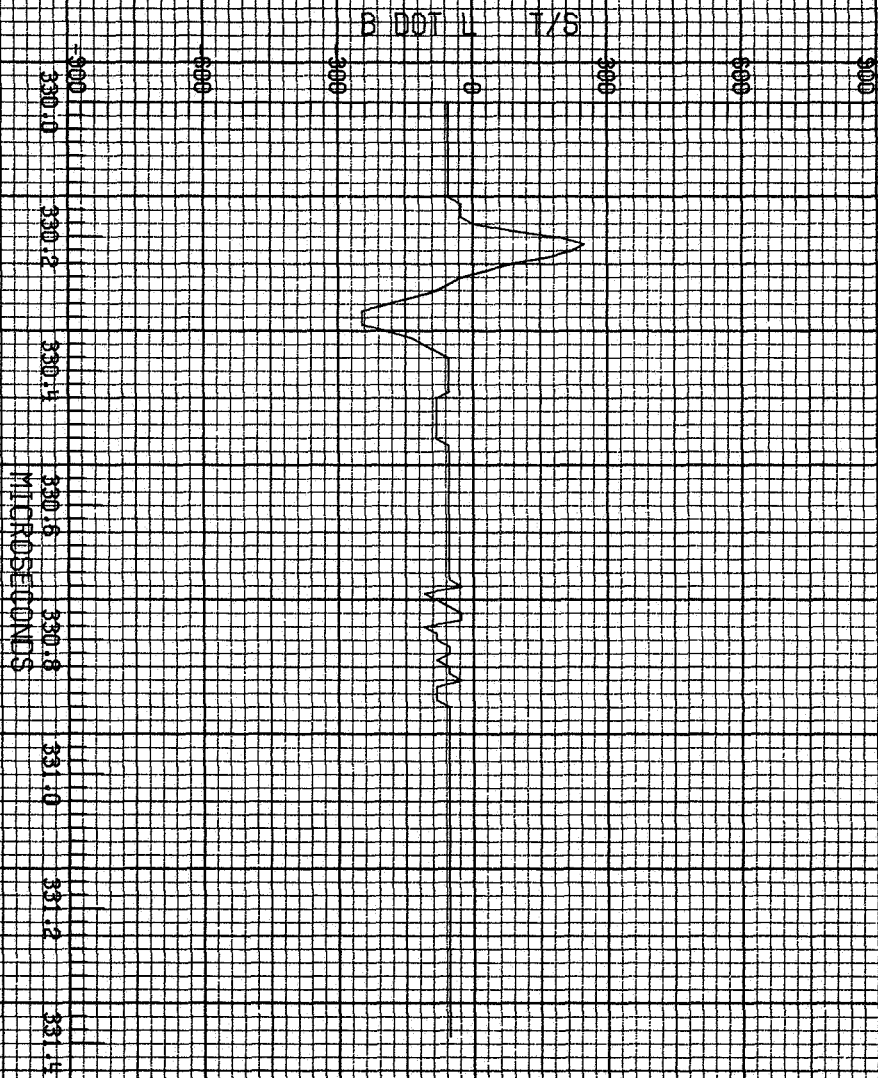
RUN NO. 11



F106 LIGHTNING/TK 8/THOMBS

TEST NO. 82-041

RUN NO. 12

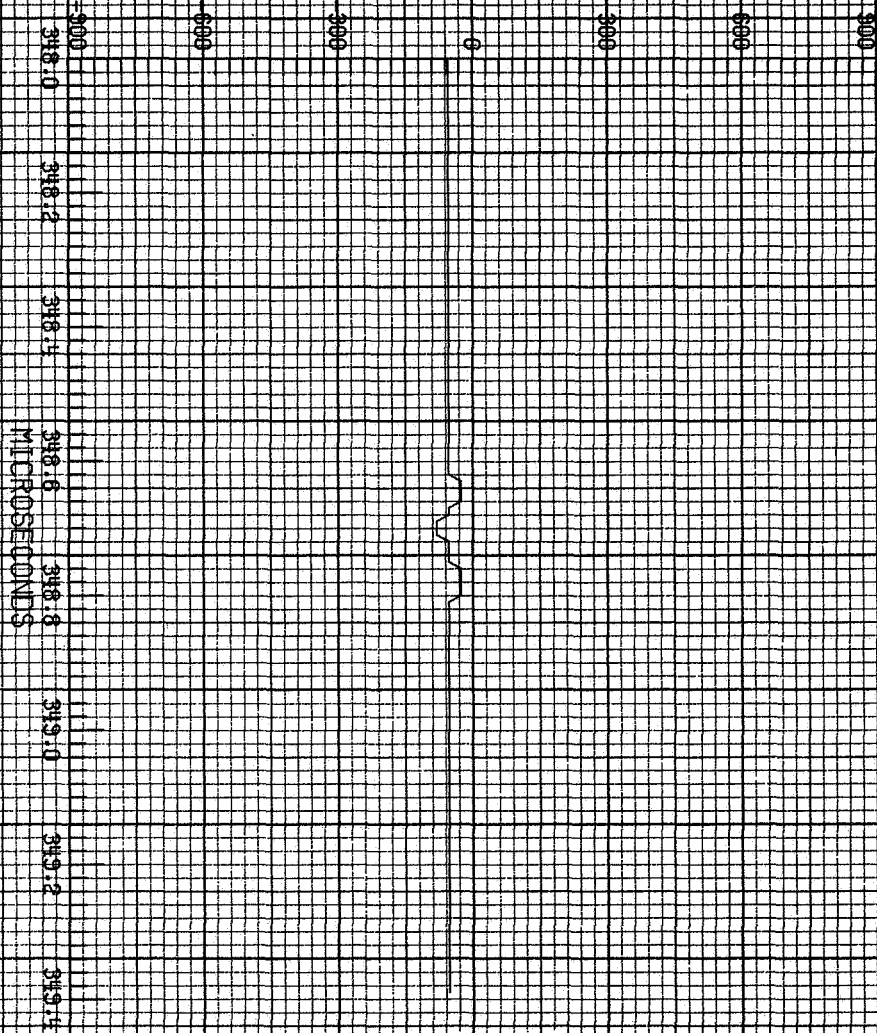


F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-641

RUN NO. 12

B DOT L T/S



F106 LIGHTNING/TK10/THOMBS

TEST NO. 82-041

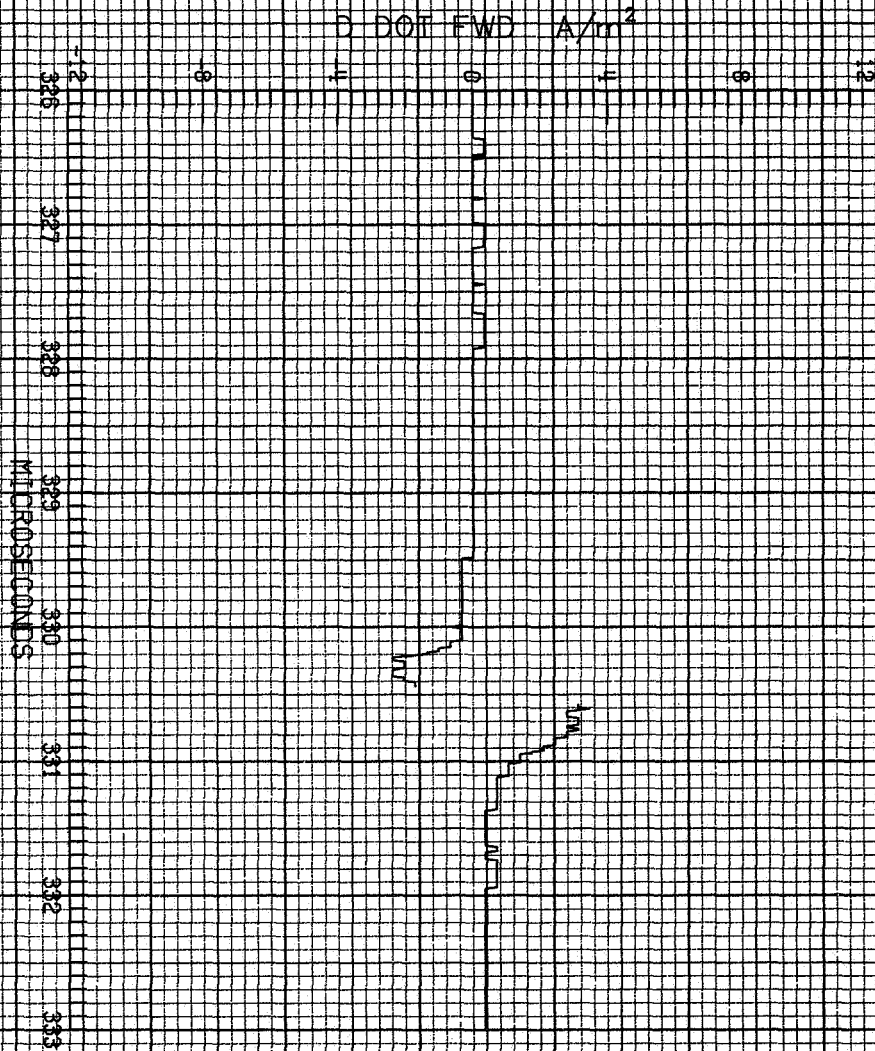
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TEST NO. 82-041

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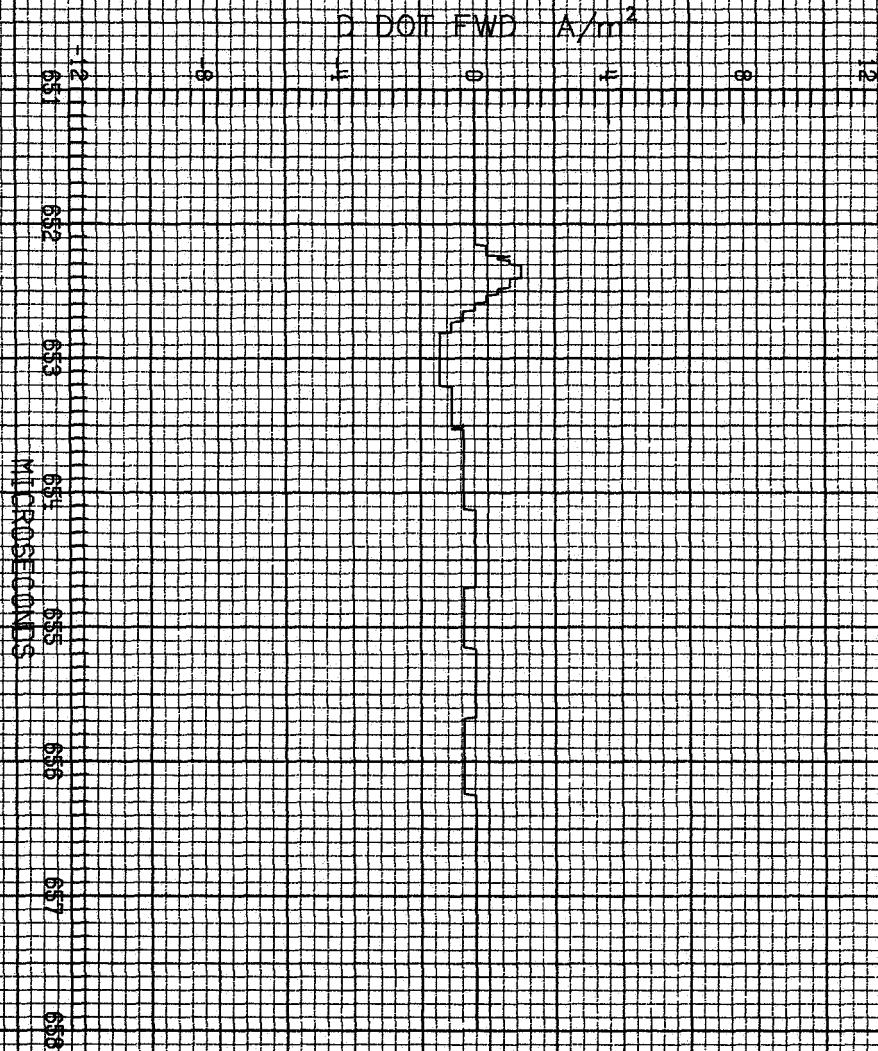


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TEST NO. 82-041

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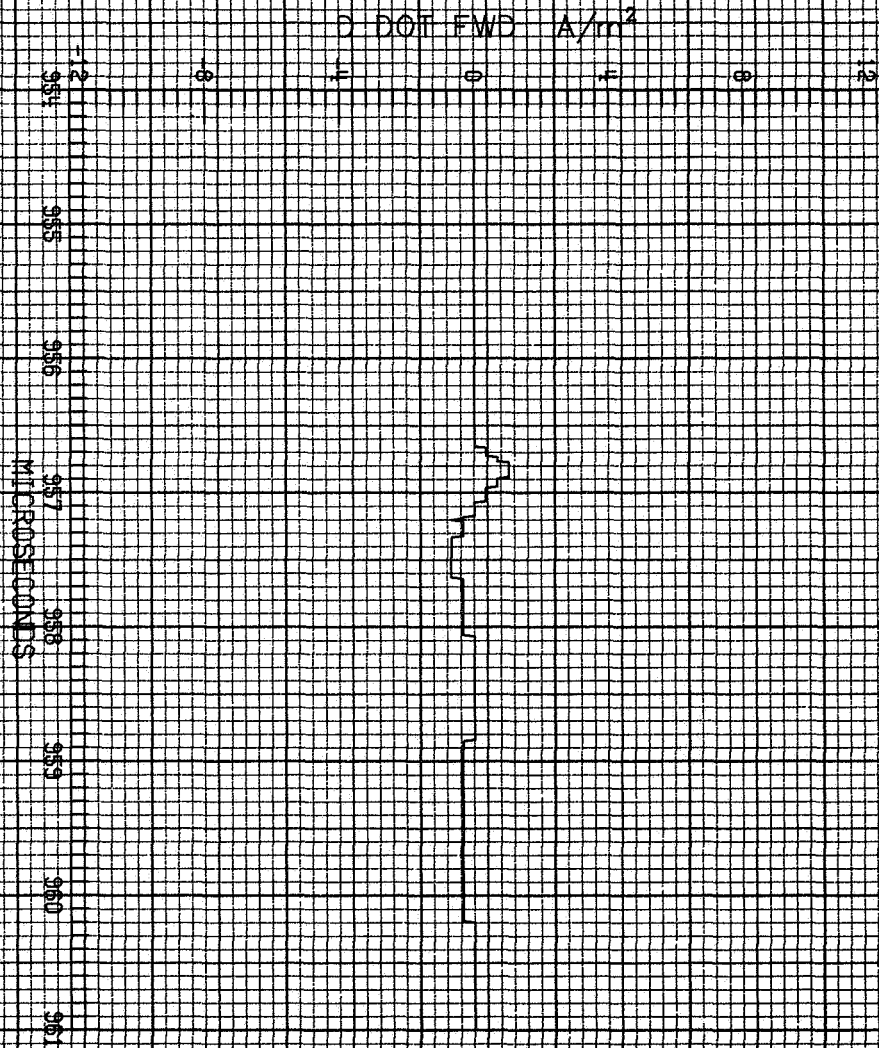


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F106 LIGHTNING/TK10/THOMAS

TEST NO. 82-041

RUN NO. 12



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TEST NO. 82-041

RUN NO. 12

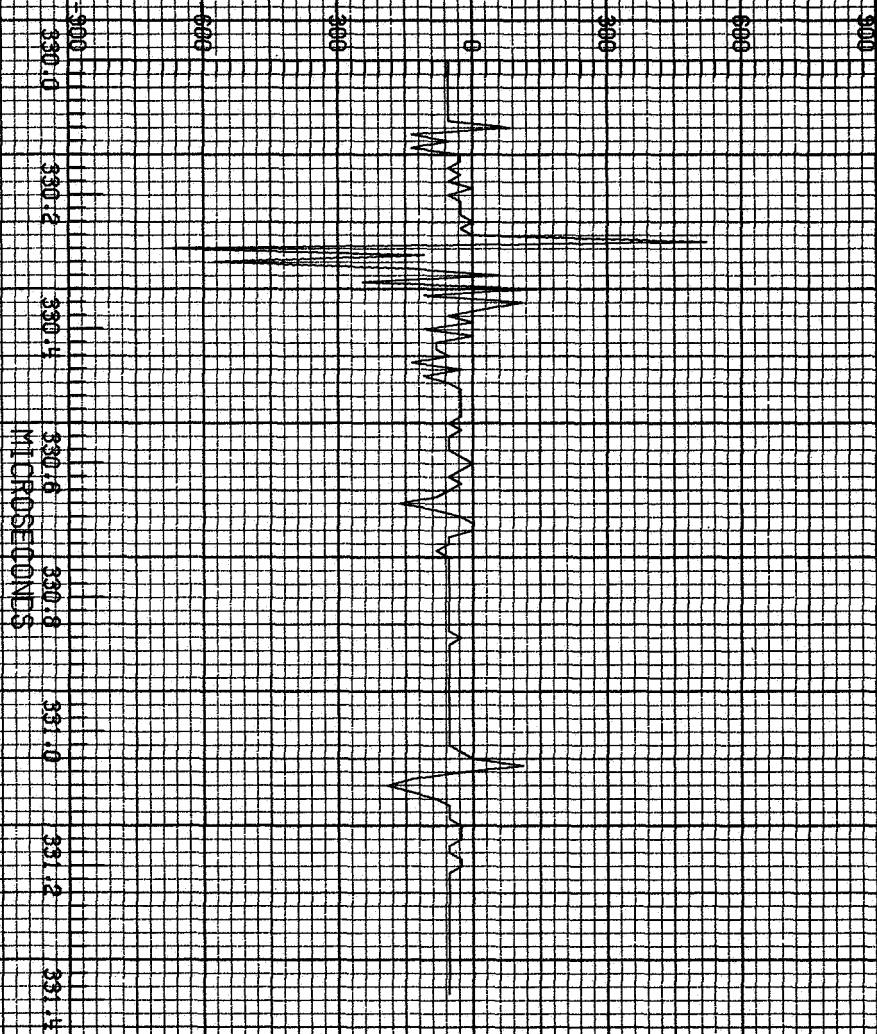


F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-041

RUN NO. 15

B DOT L T/S

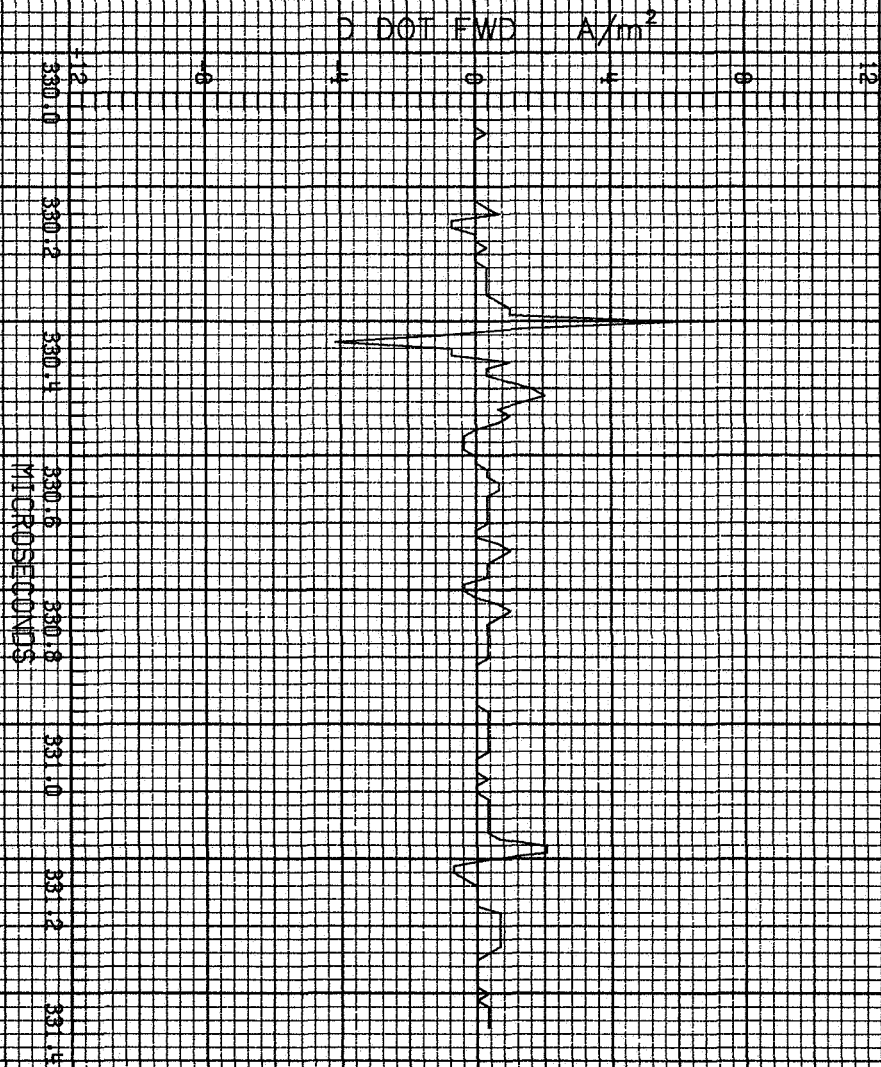


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F106 LIGHTNING/TK10/THOMBS

TEST NO. 82-041

RUN NO. 13



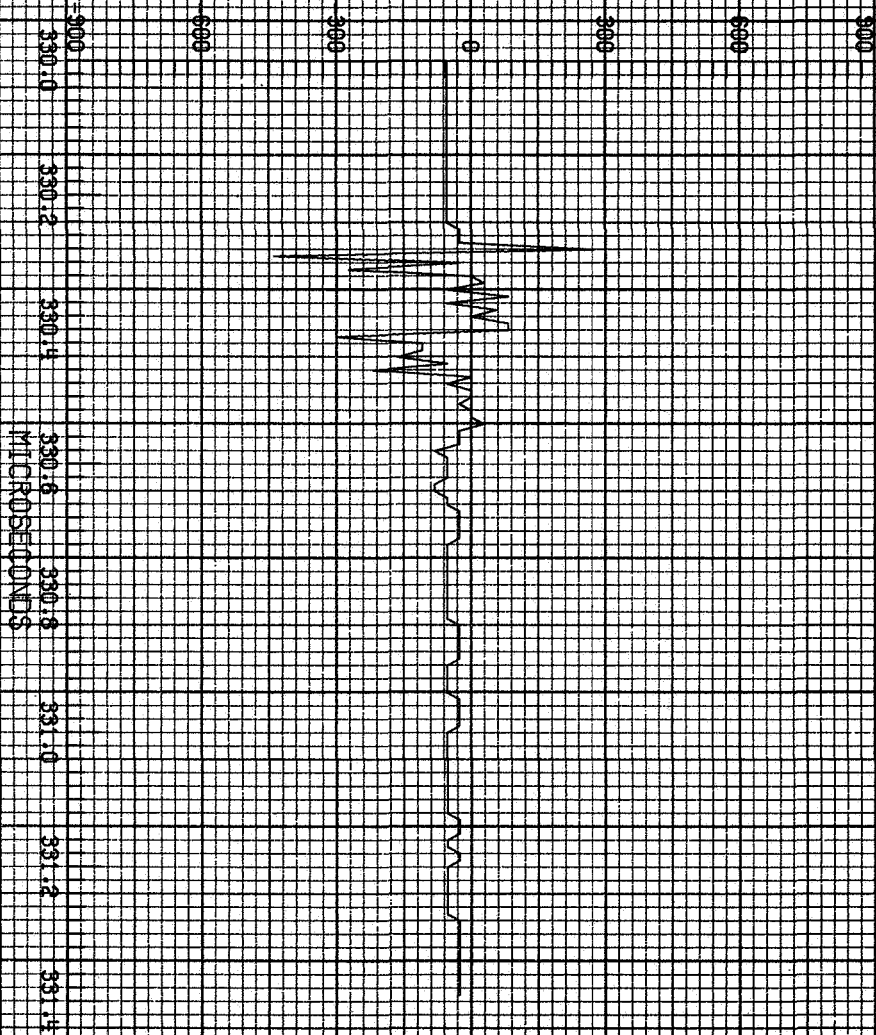
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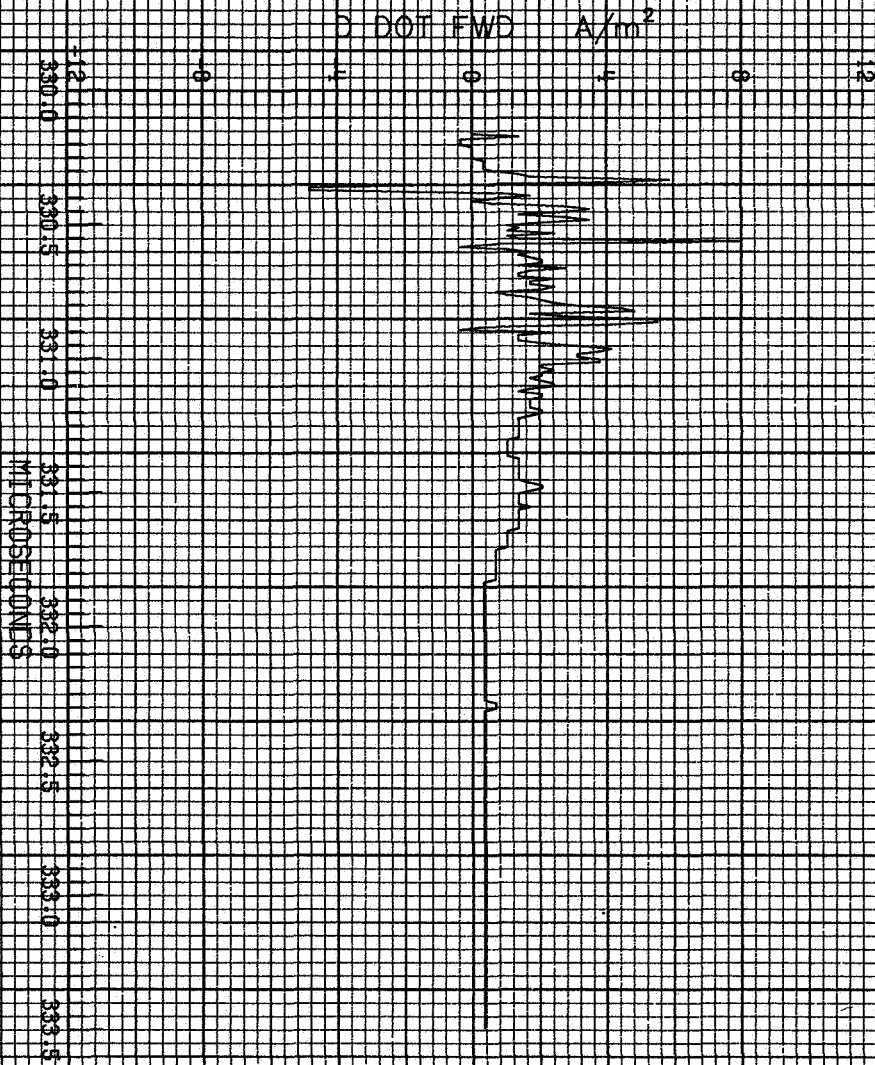
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F106 LIGHTNING/TK10/THOMES

TEST NO. 82-041

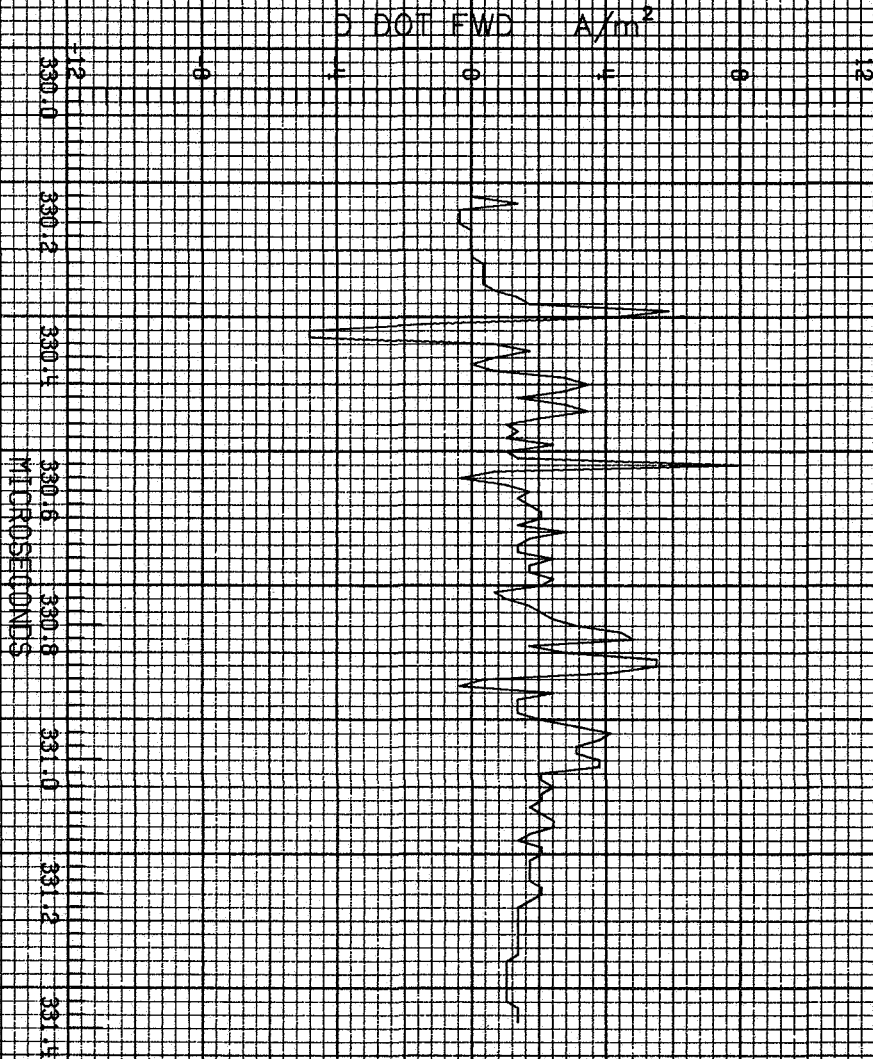
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TEST NO. 82-041

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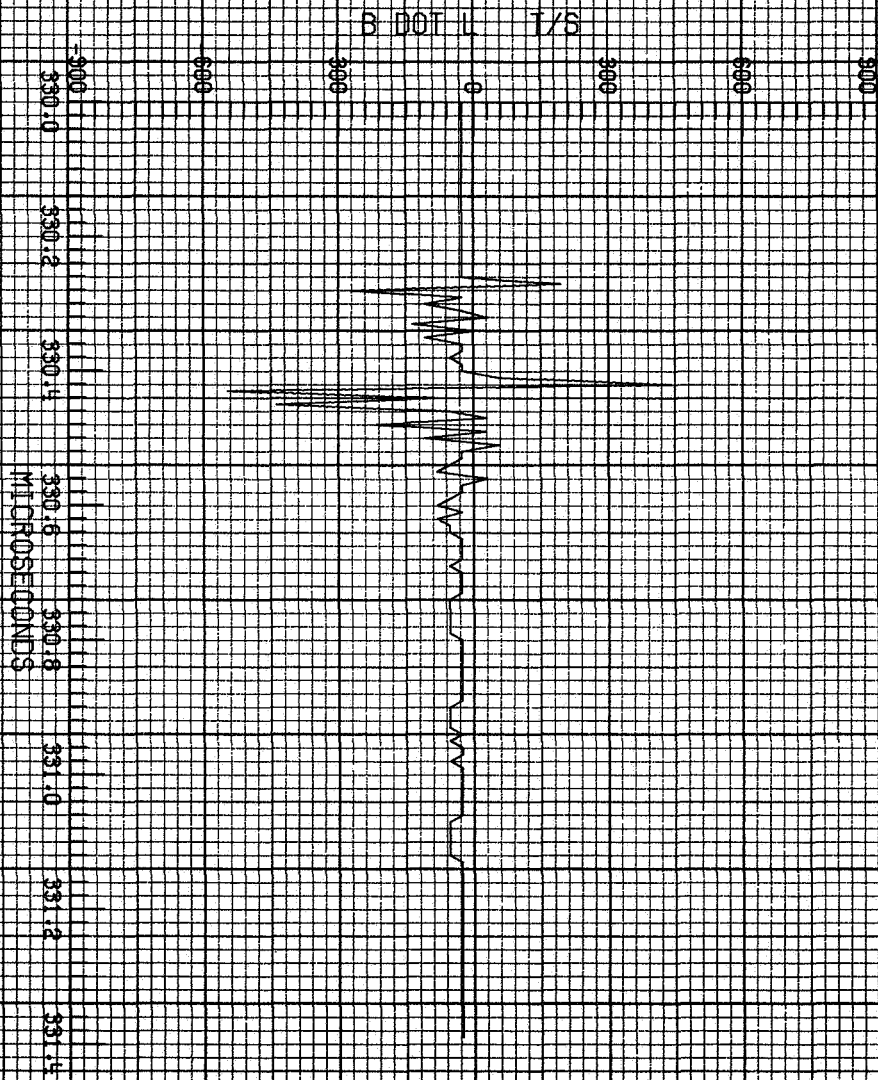


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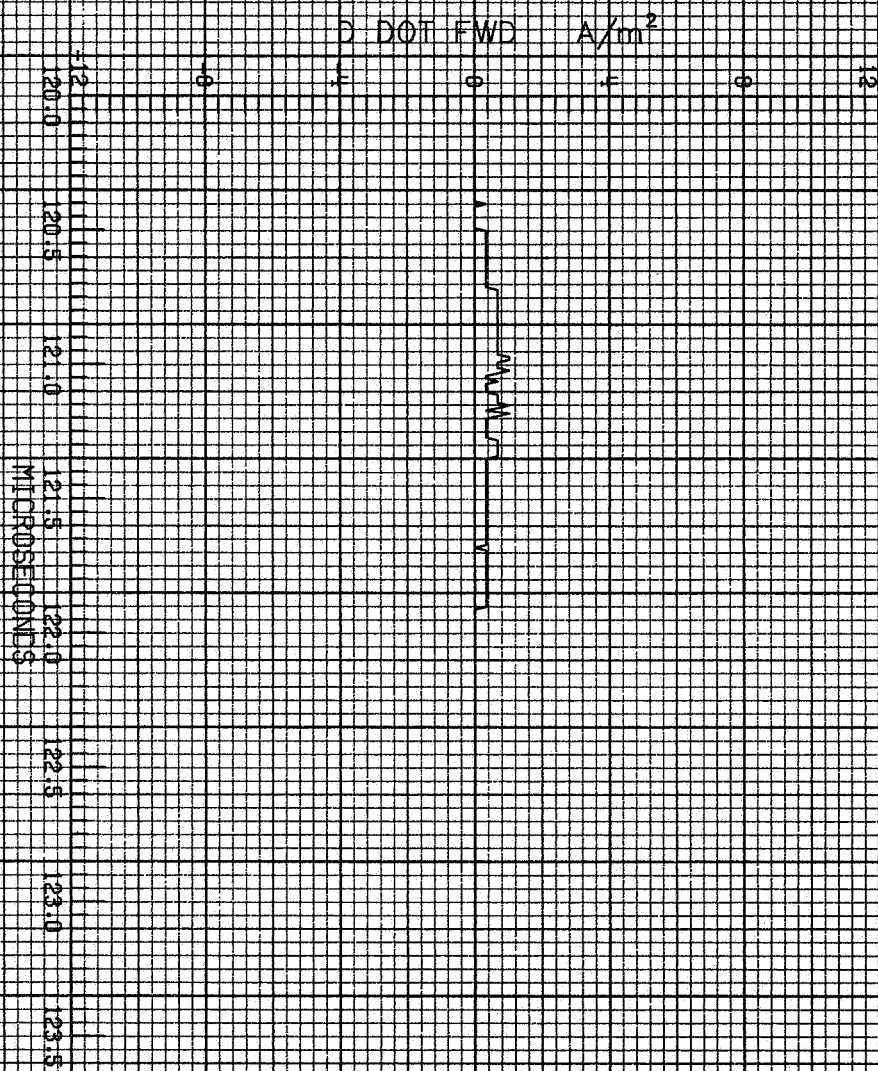


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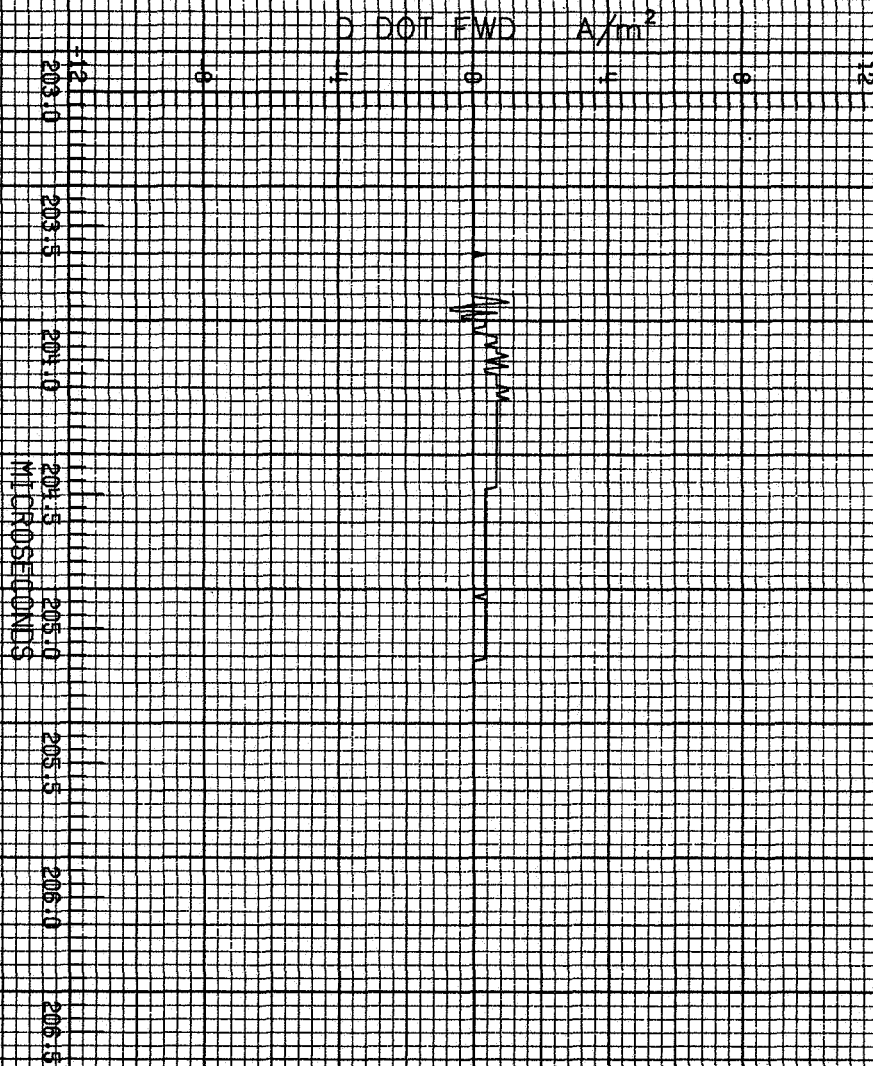


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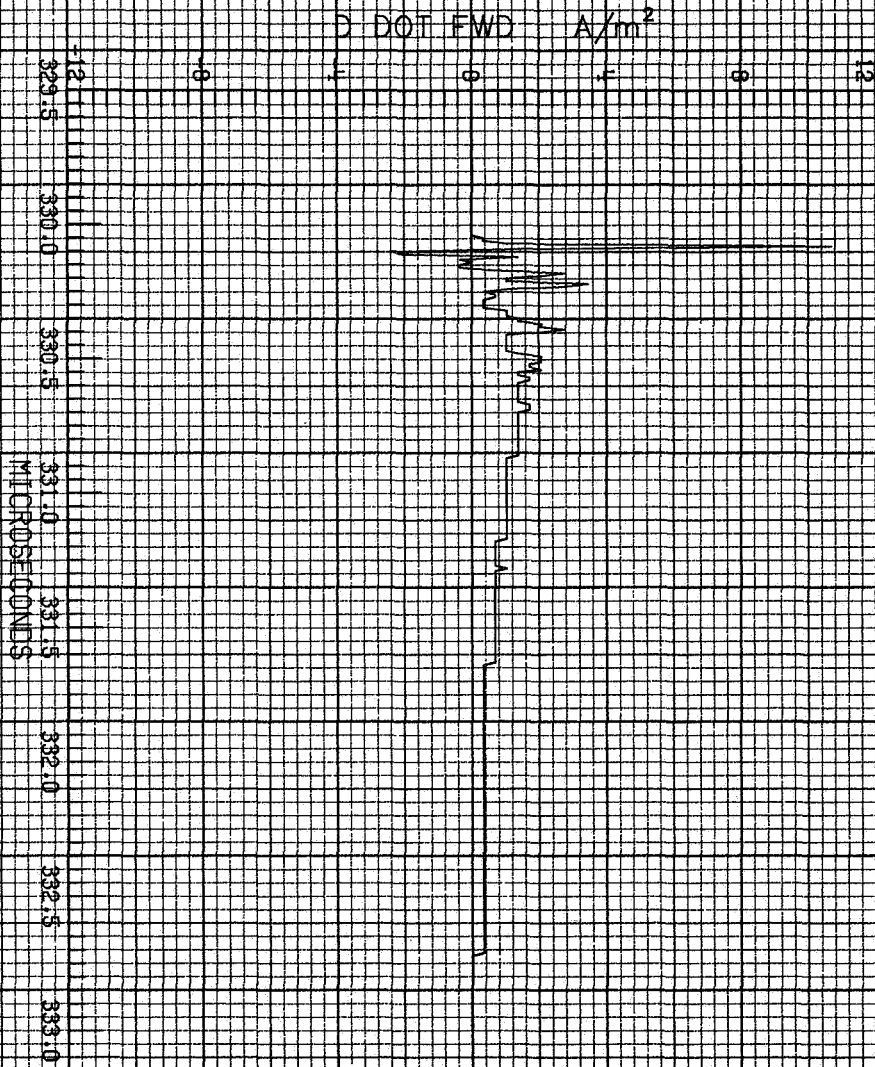


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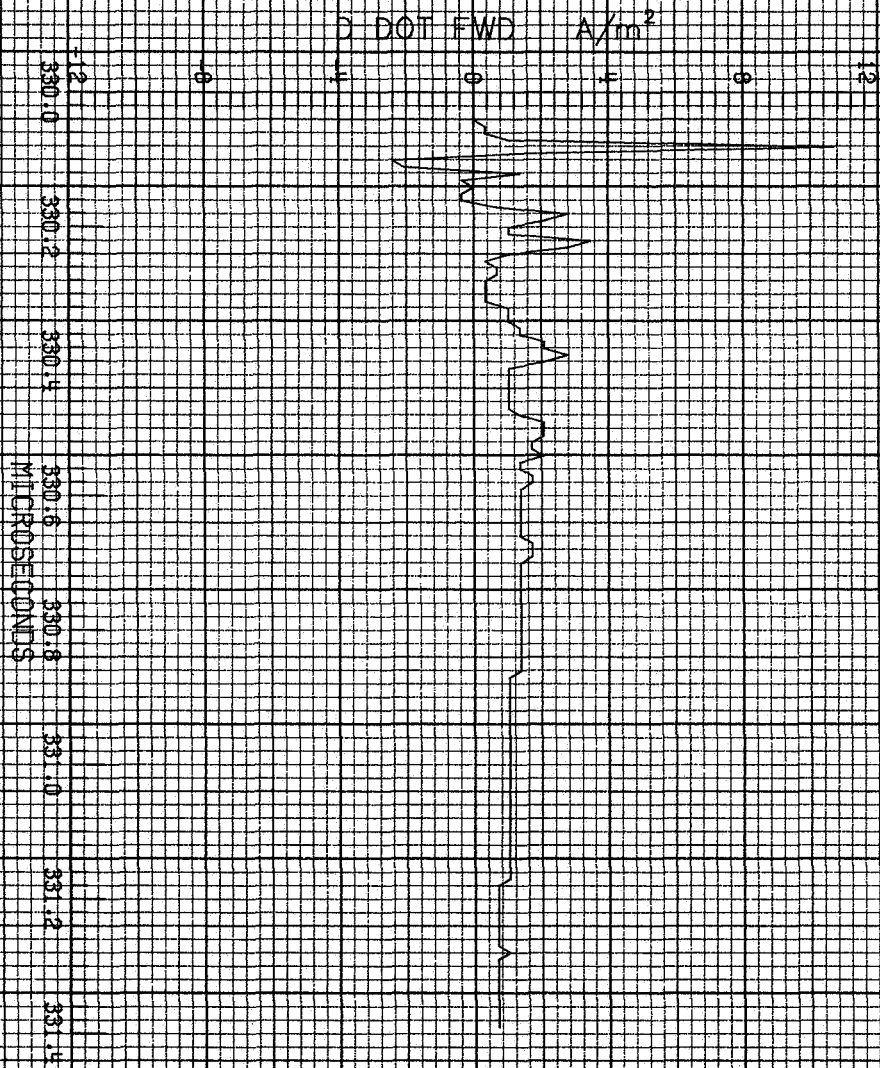
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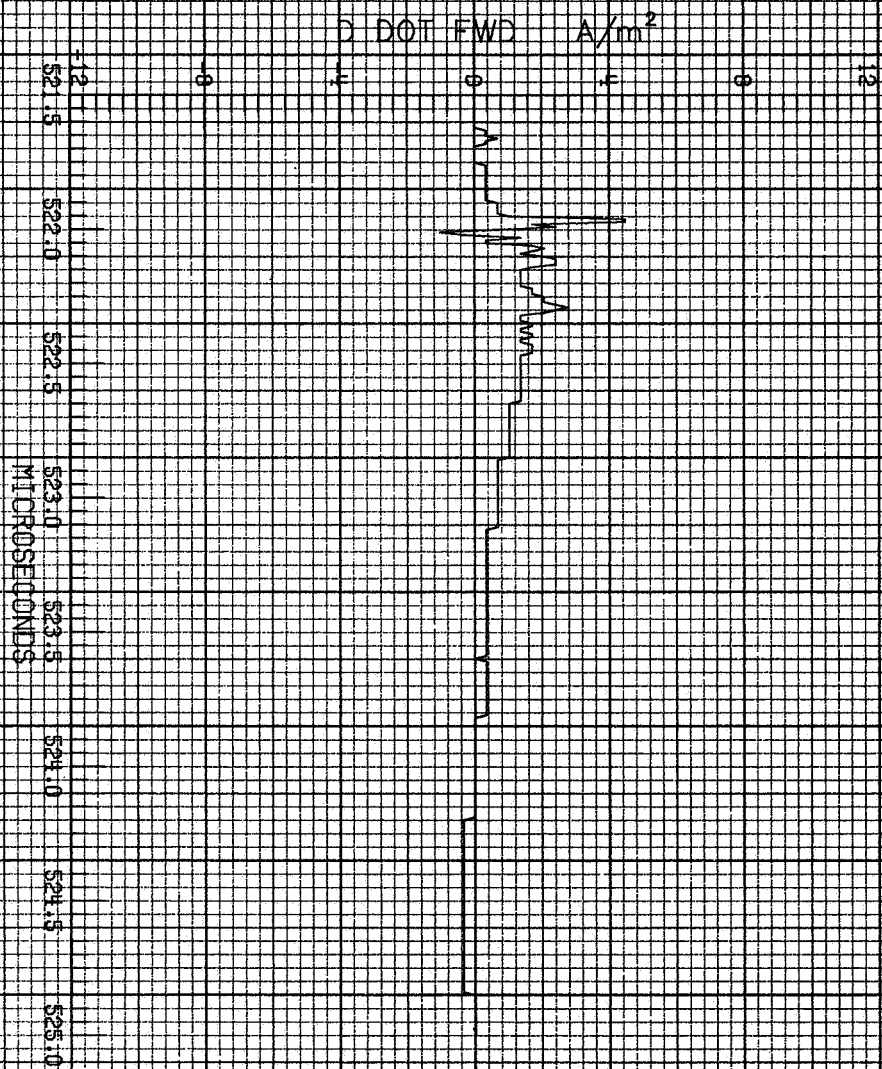


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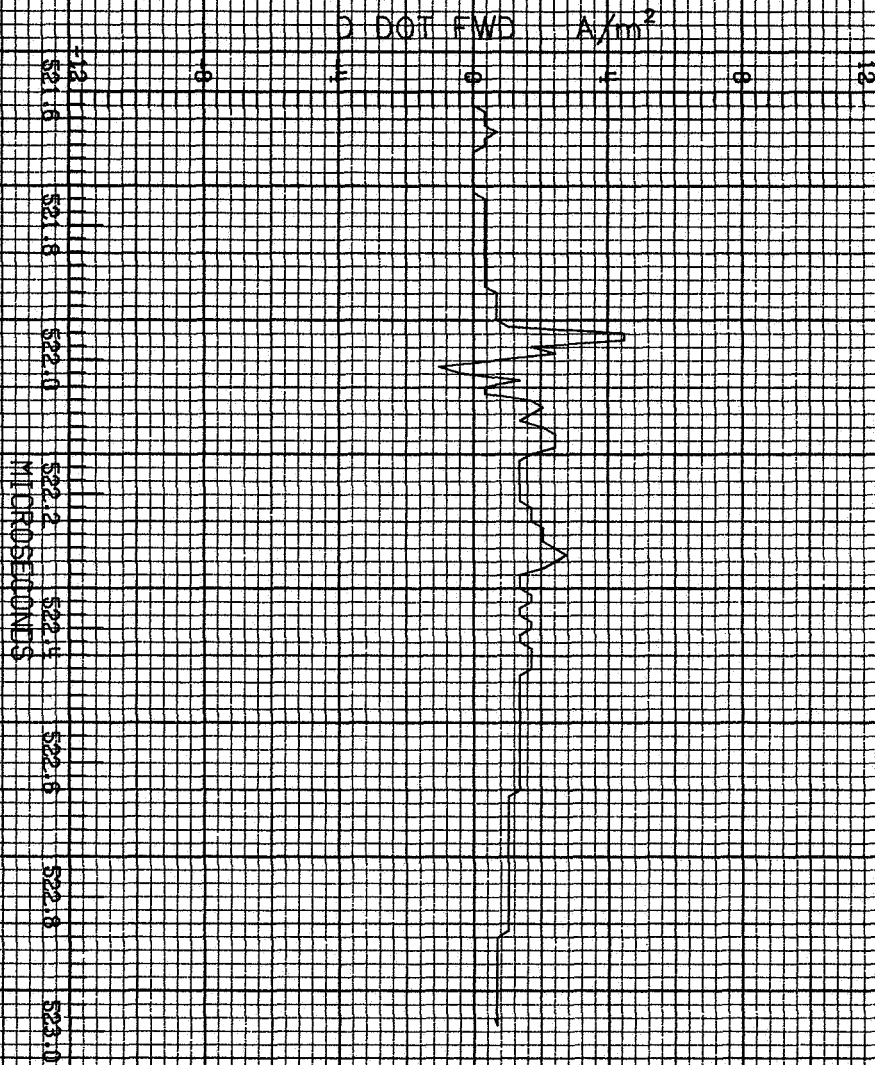


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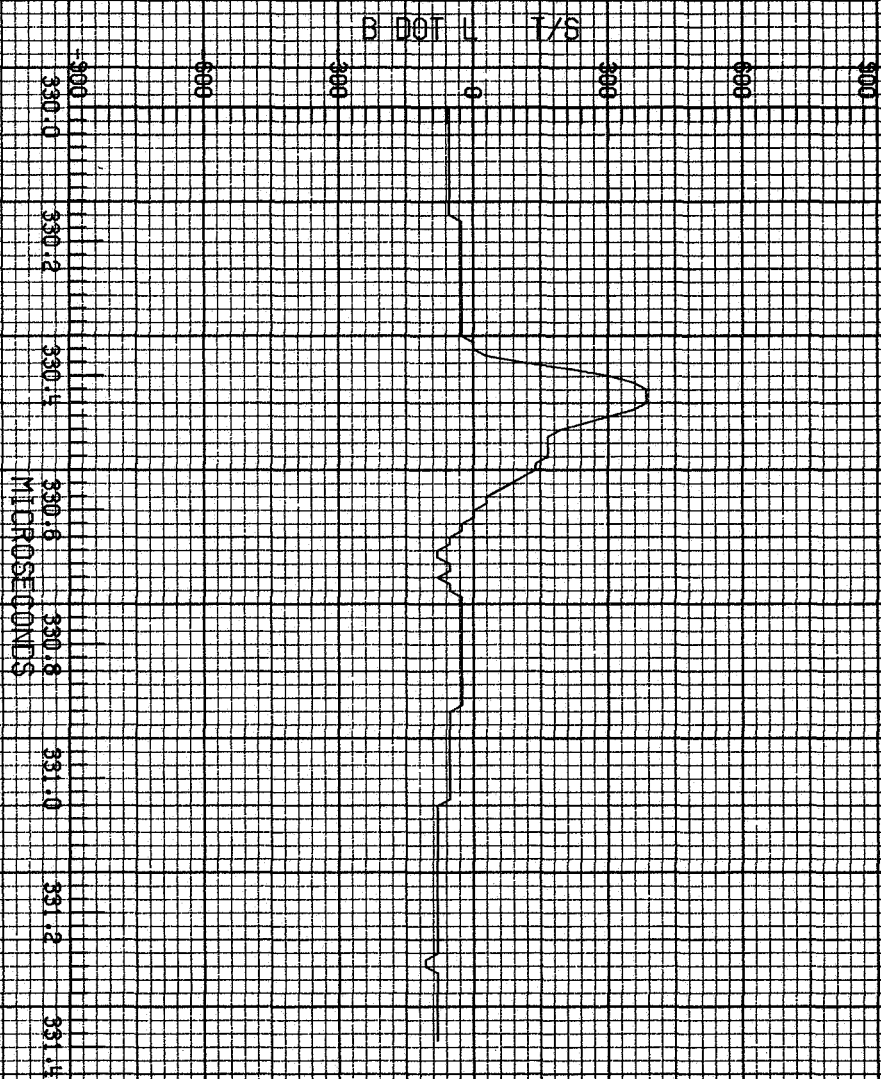


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F106 LIGHTNING/TK 8/THOMPS

TEST NO. 82-041

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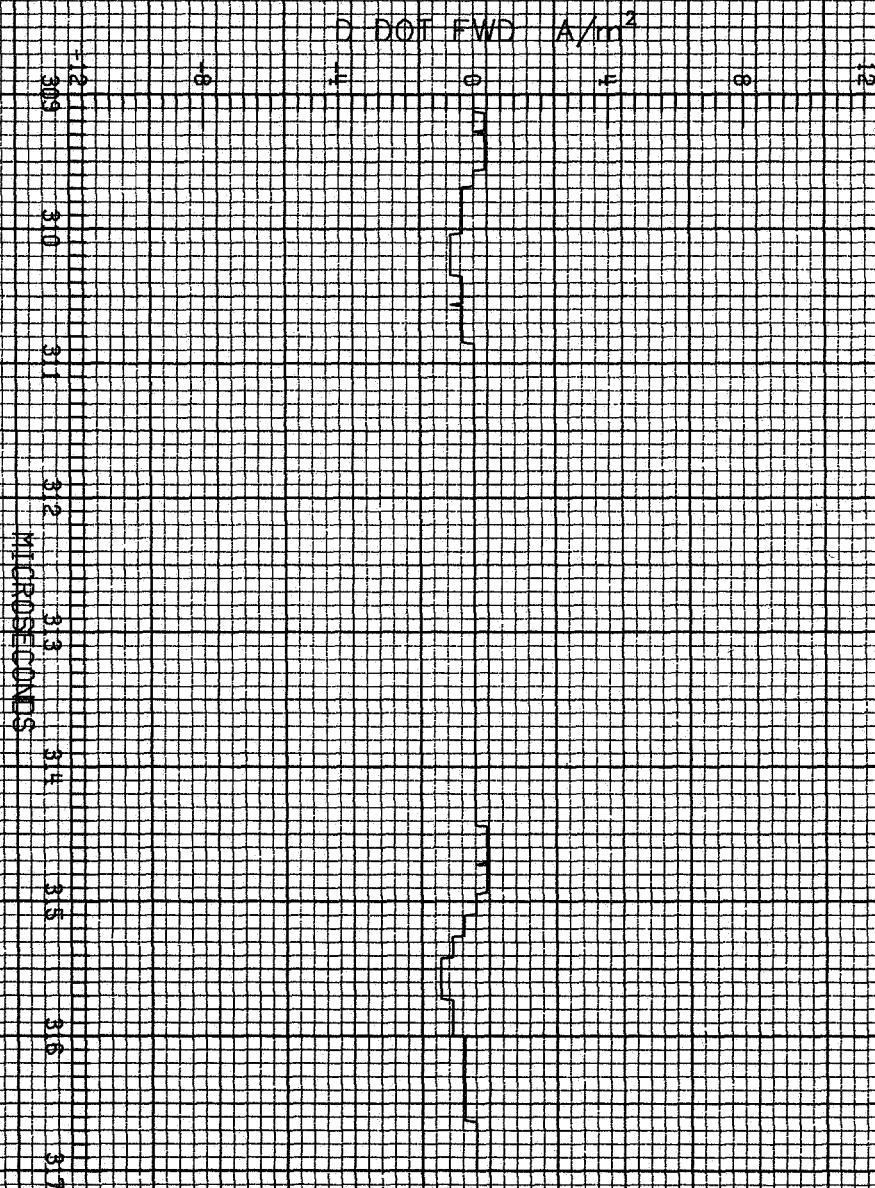


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TEST NO. 82-041

RUN NO. 16

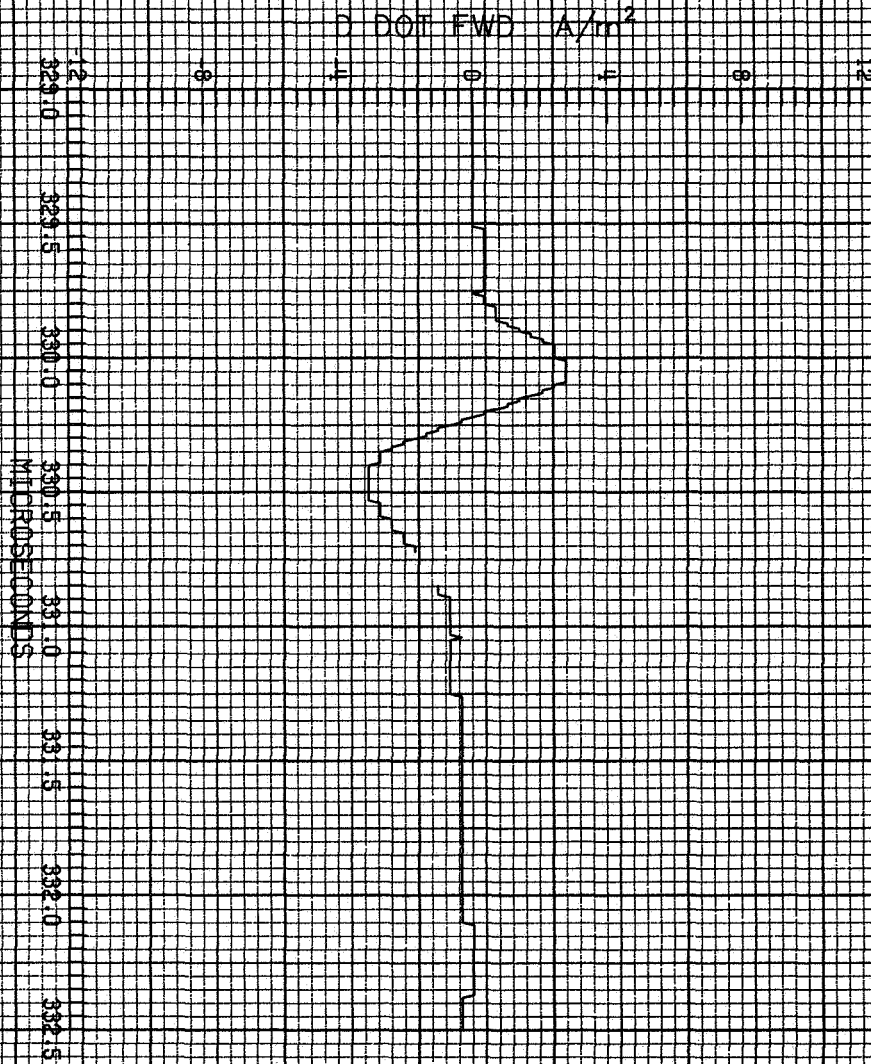


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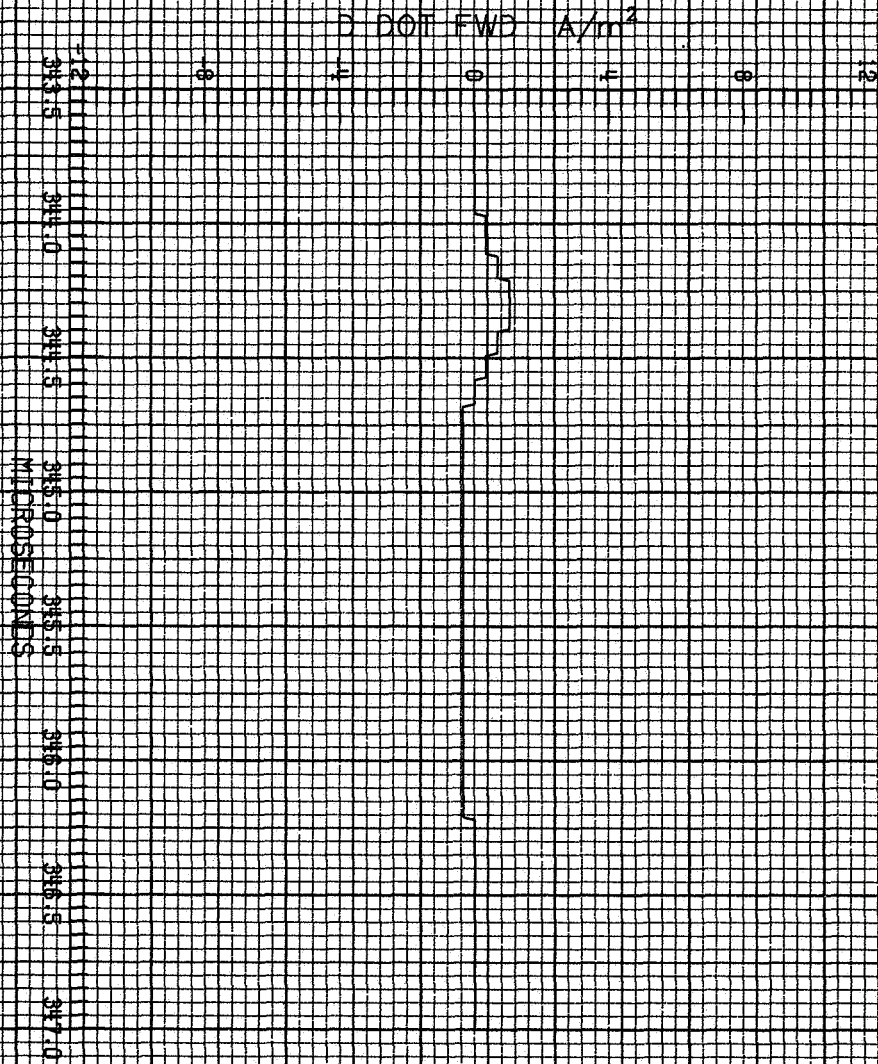
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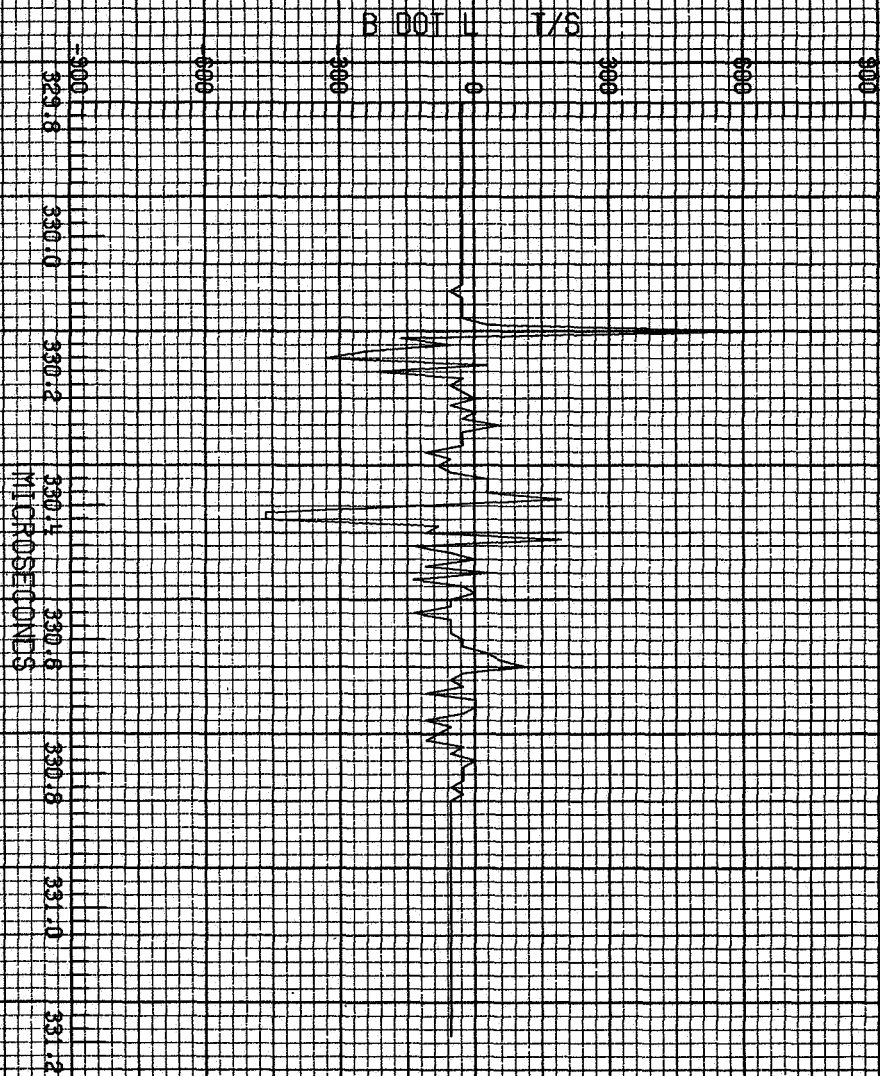
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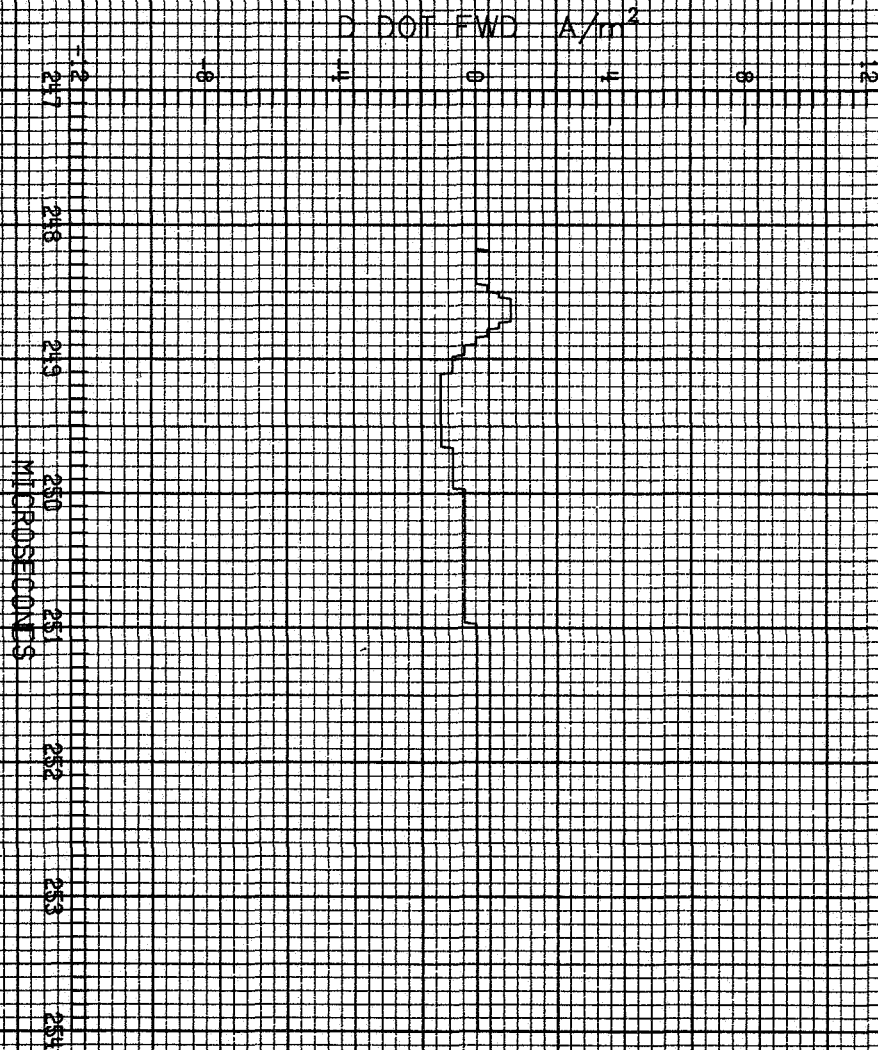
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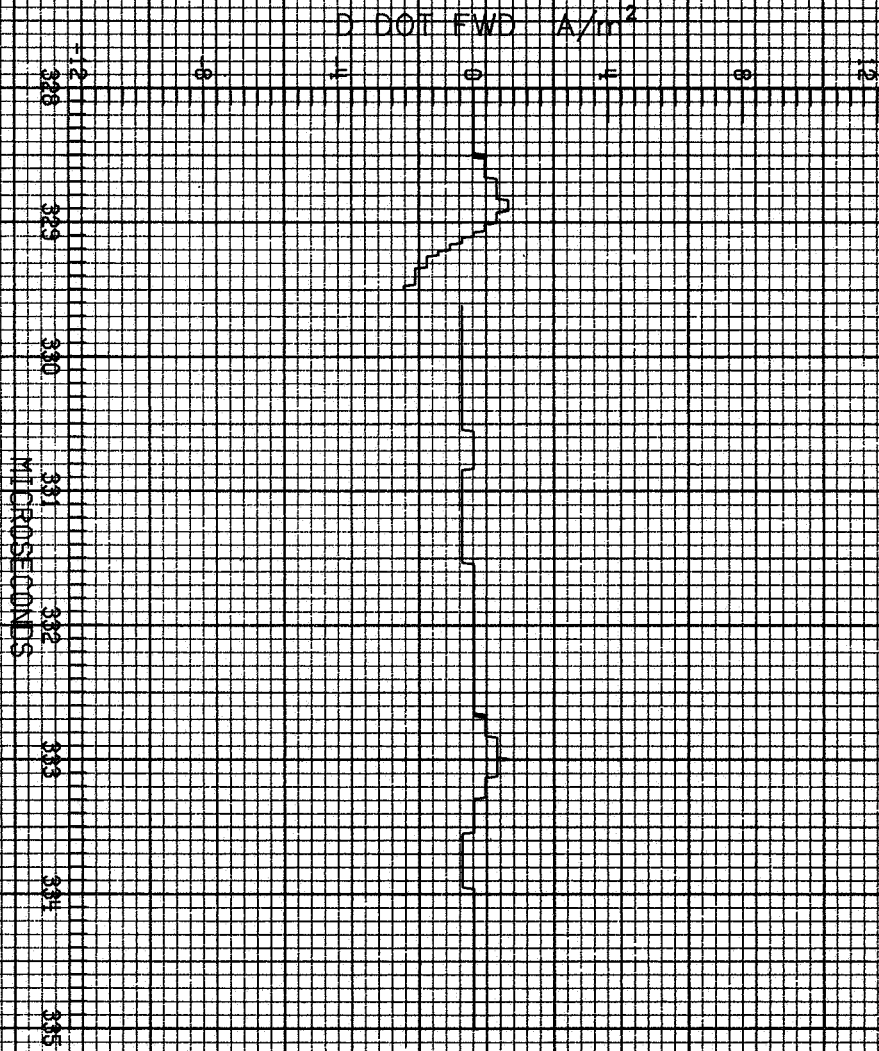


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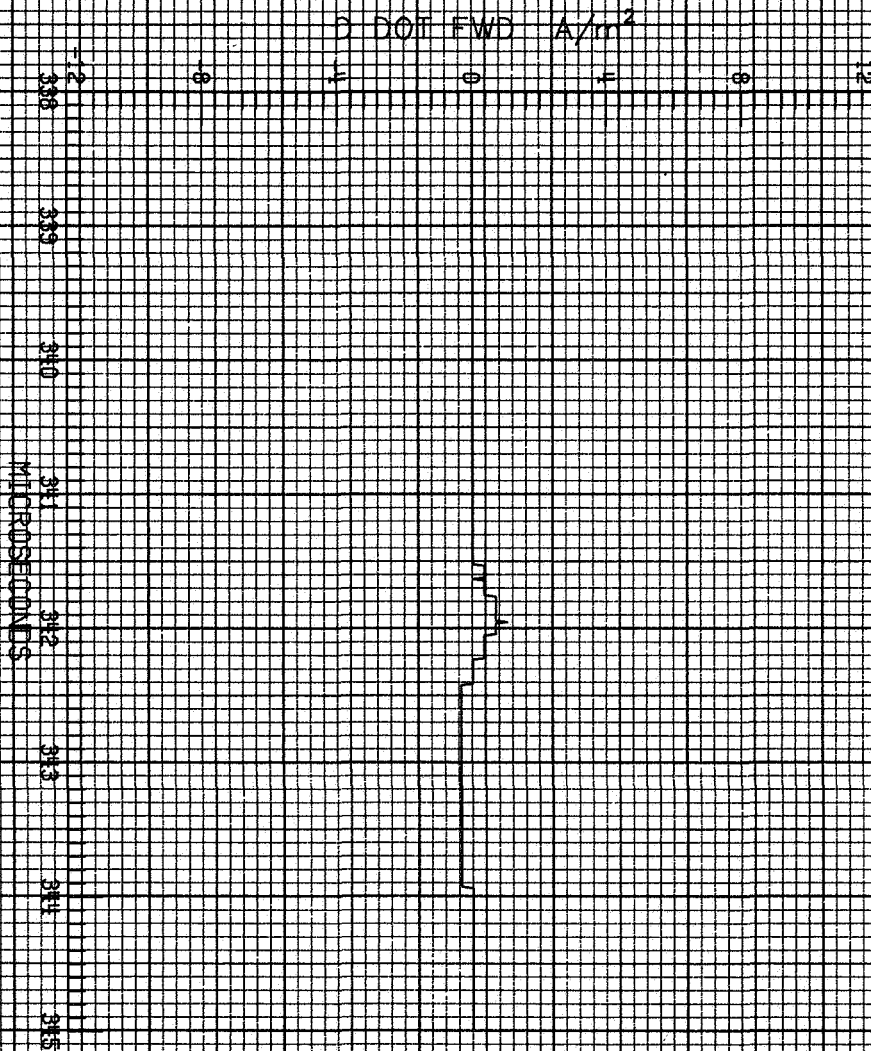


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TEST NO. 82-041

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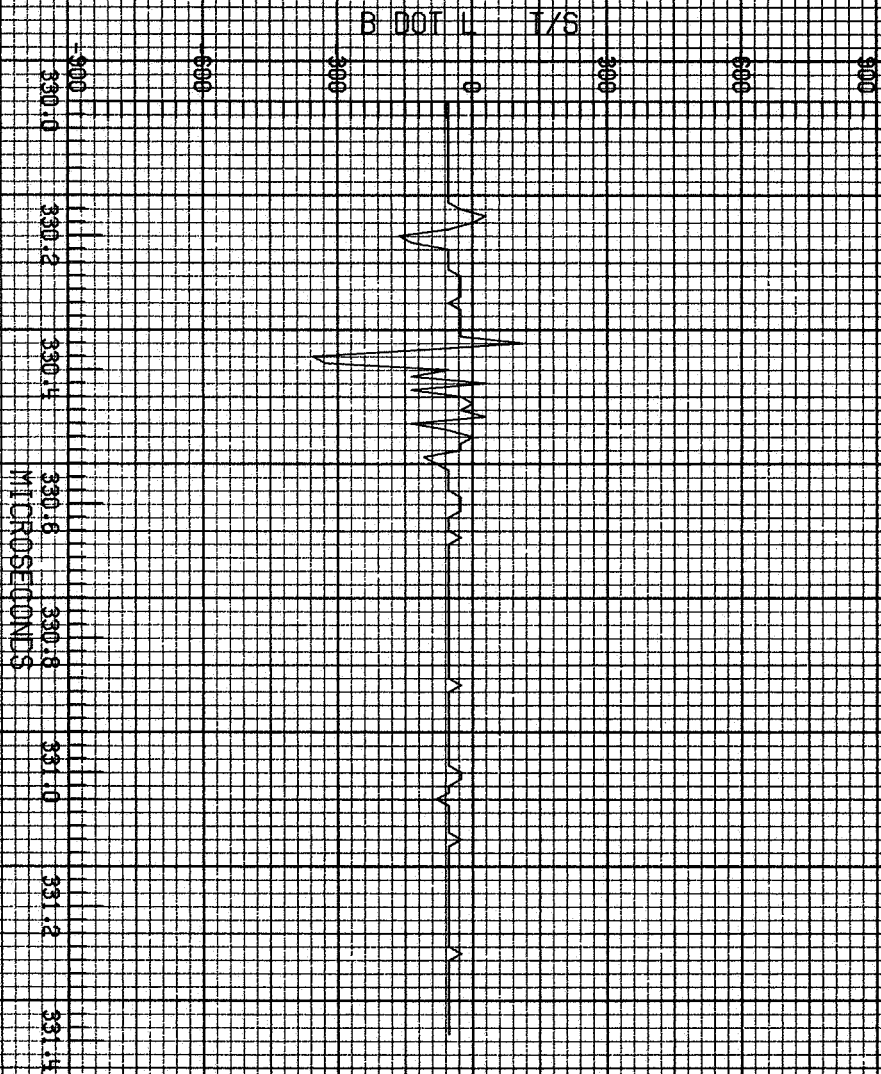


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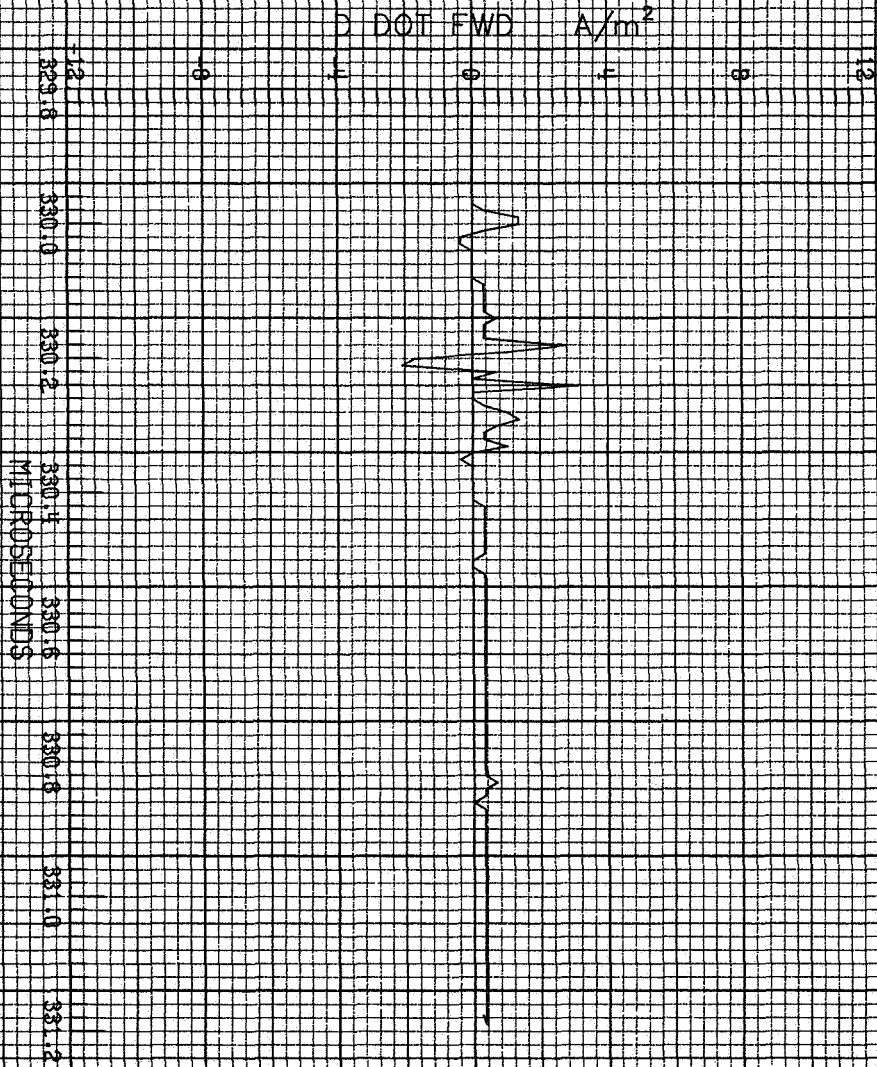
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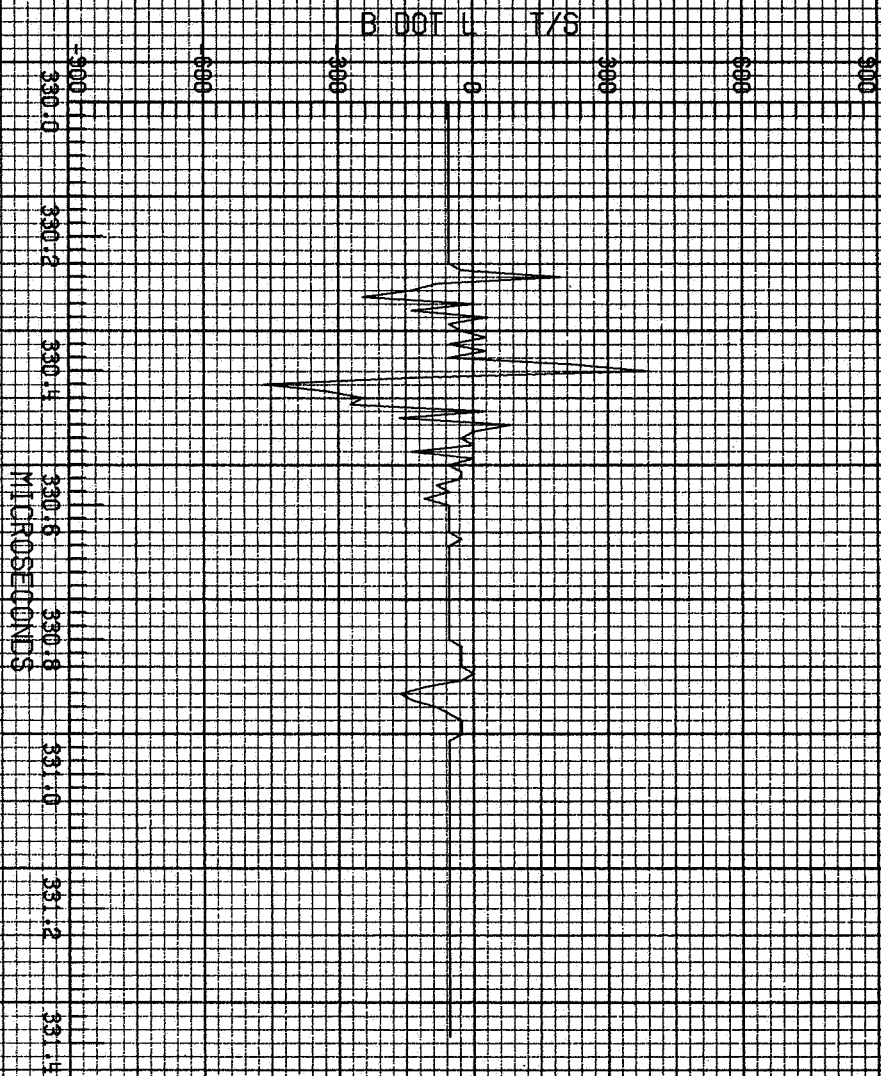


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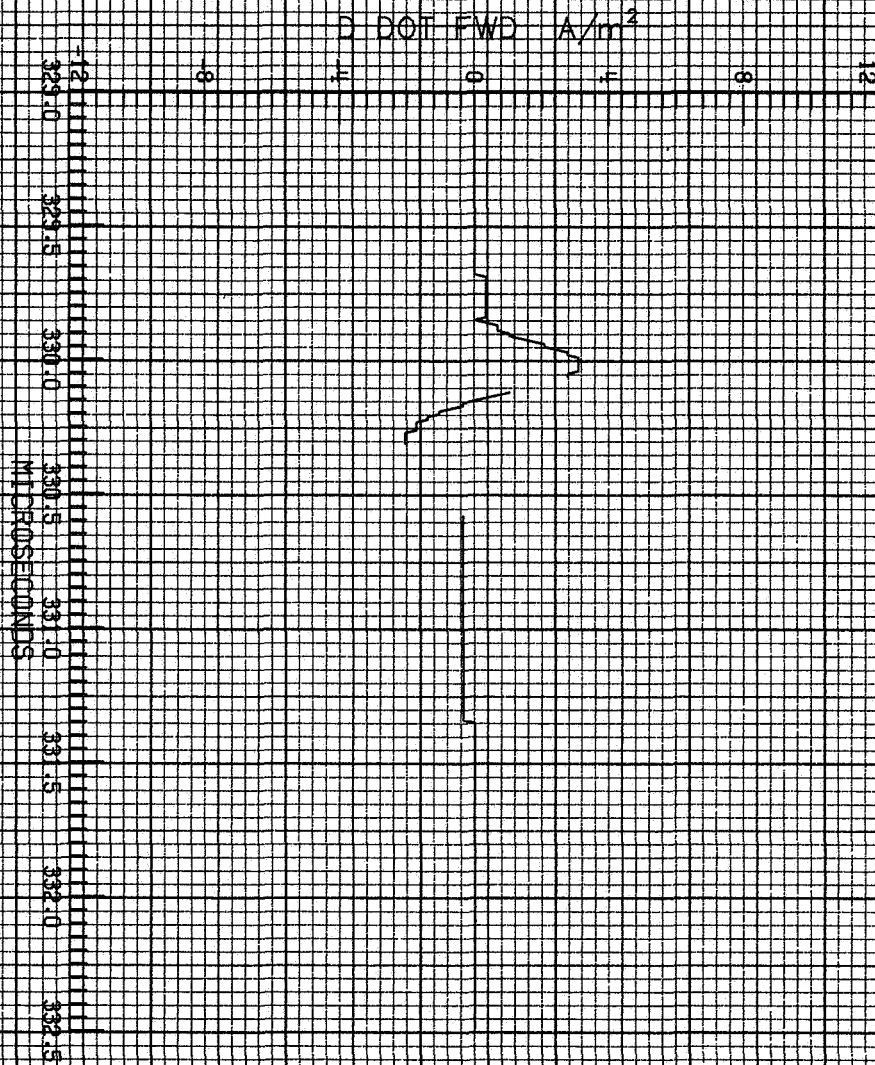


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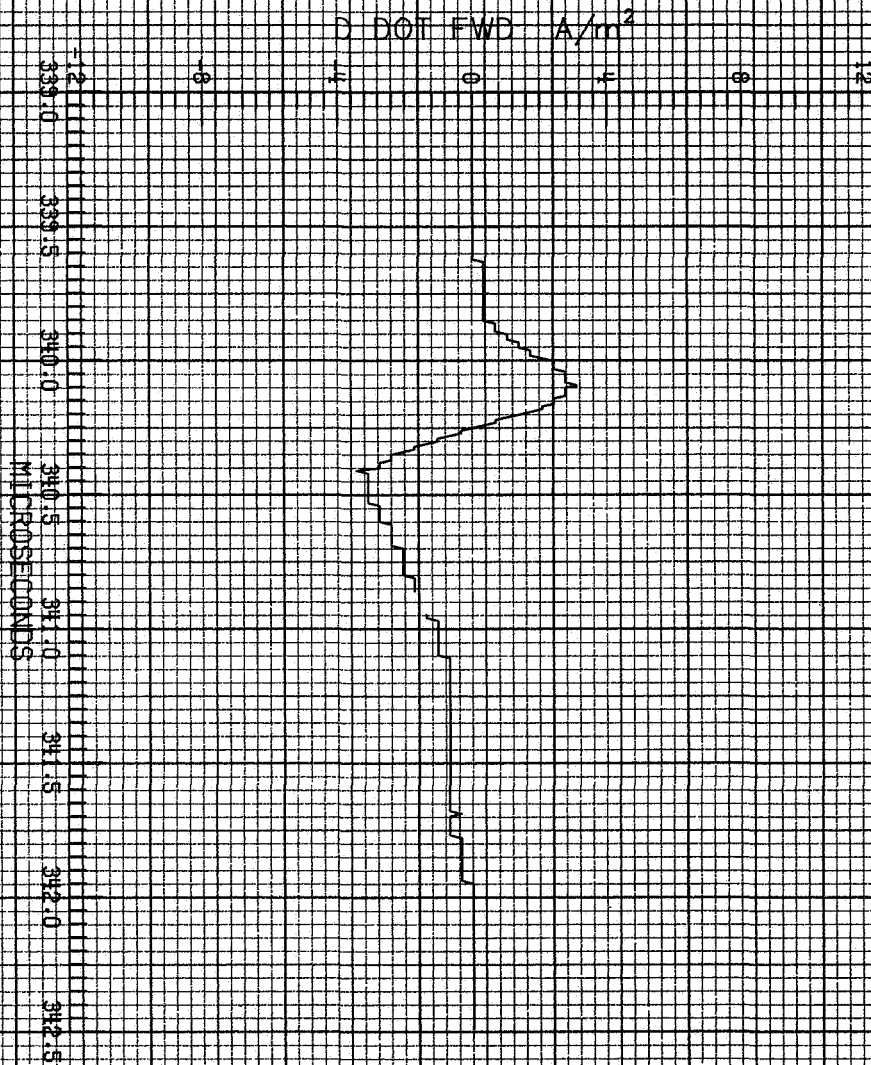


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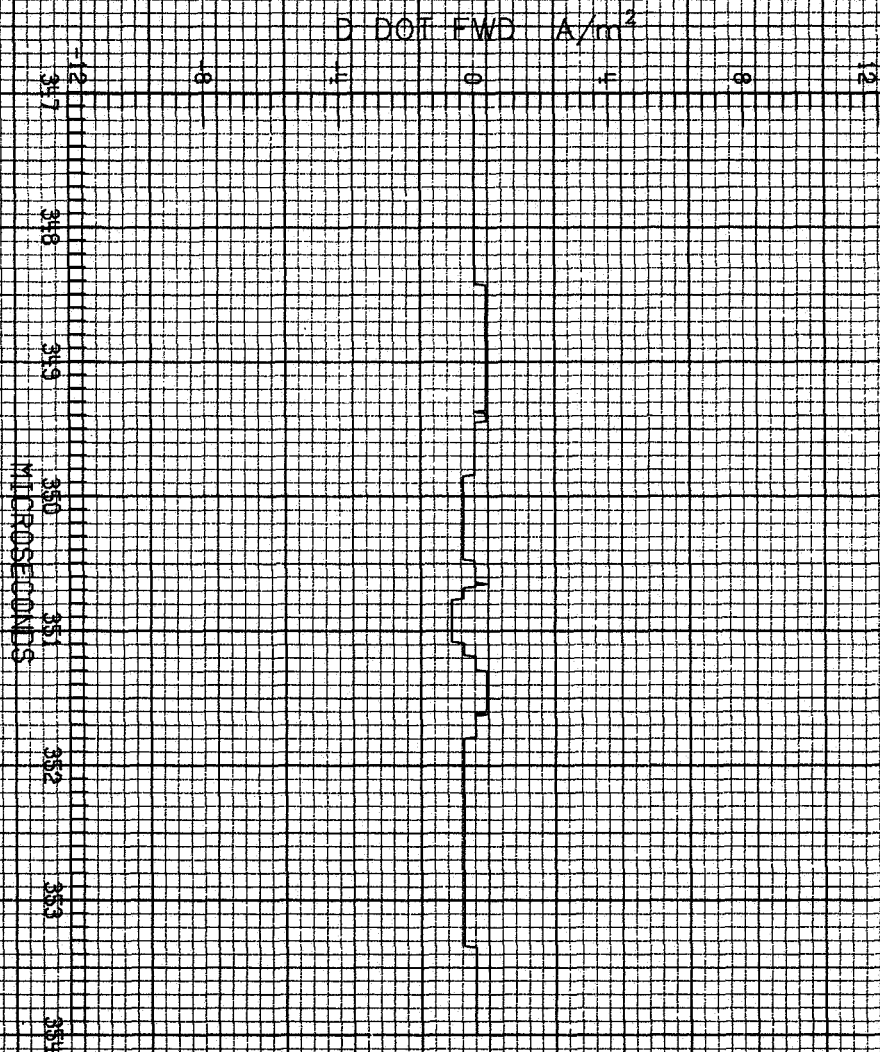


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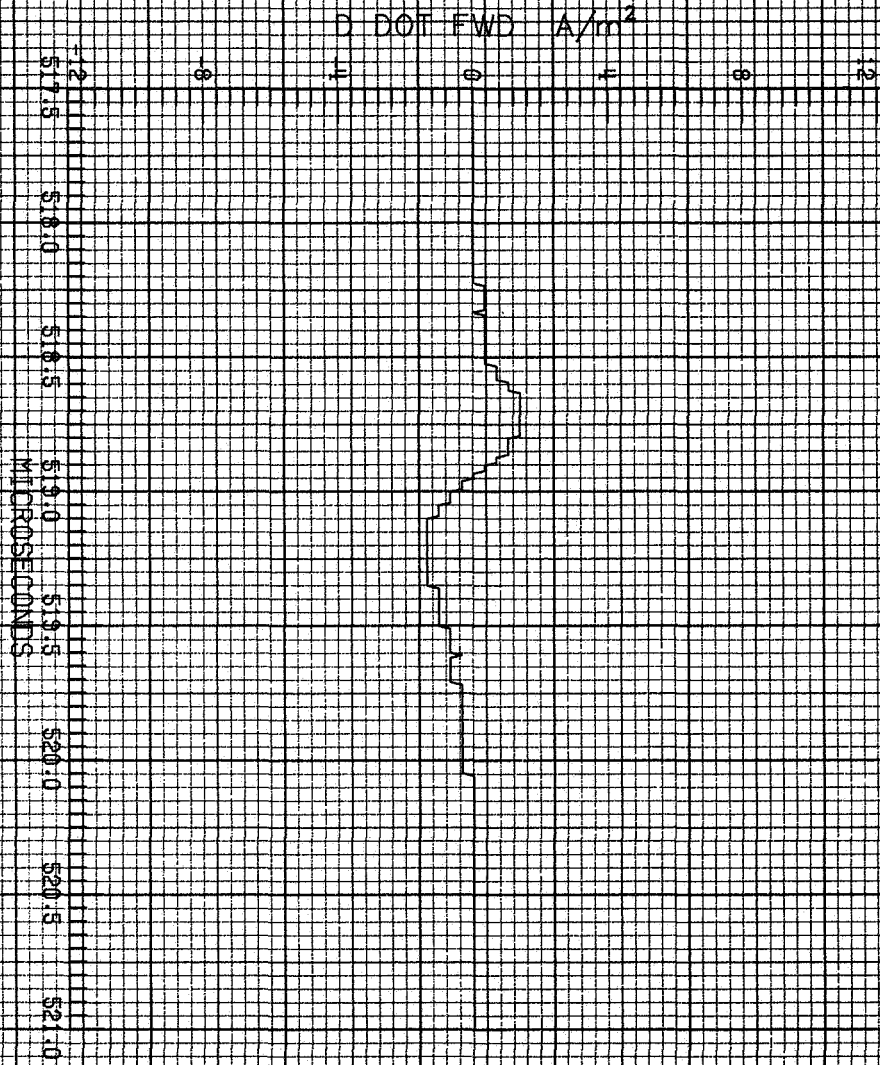
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TEST NO. 82-041

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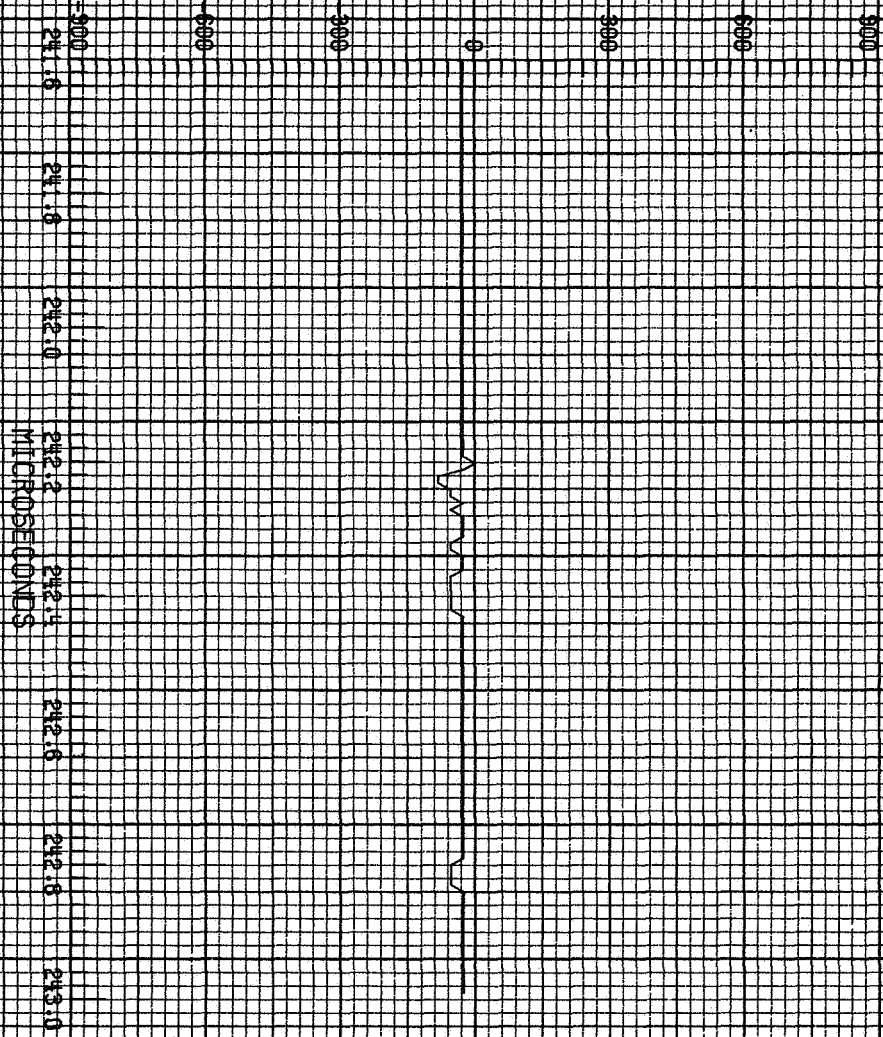
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TEST NO. 82-041

RUN NO. 20

B DOT L T/6



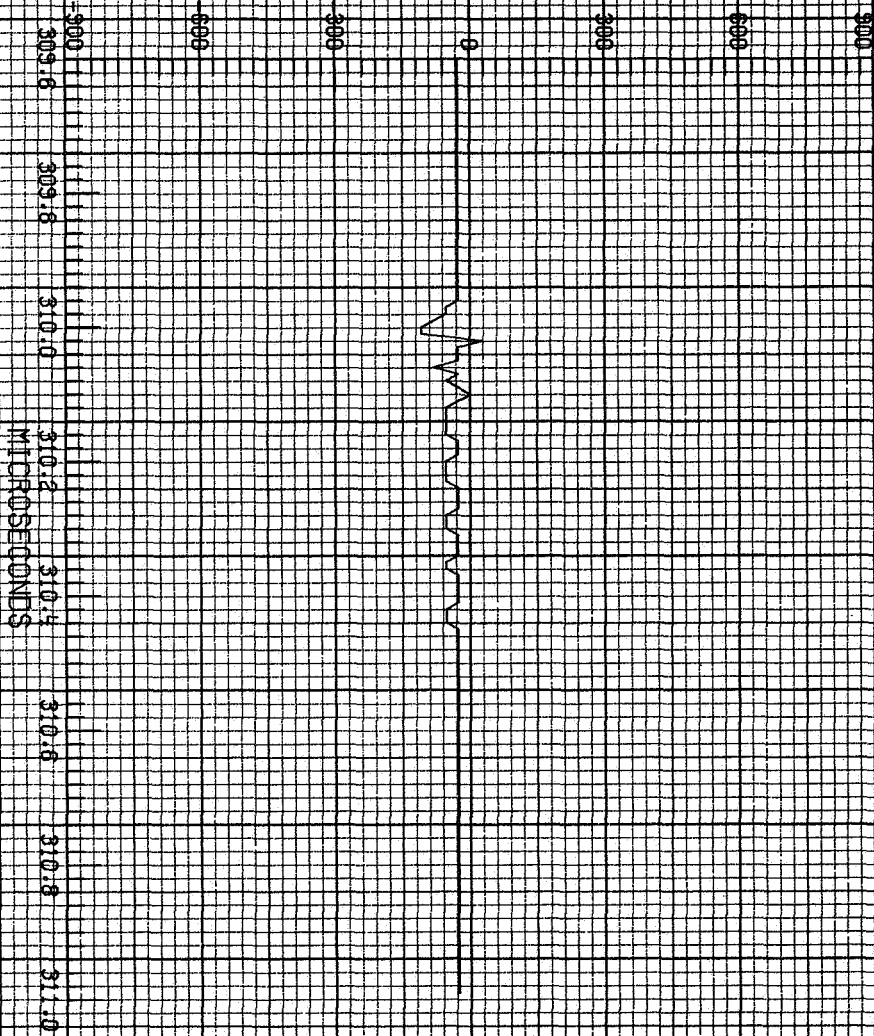
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TEST NO. 82-041

RUN NO. 20

B DOT L T/S

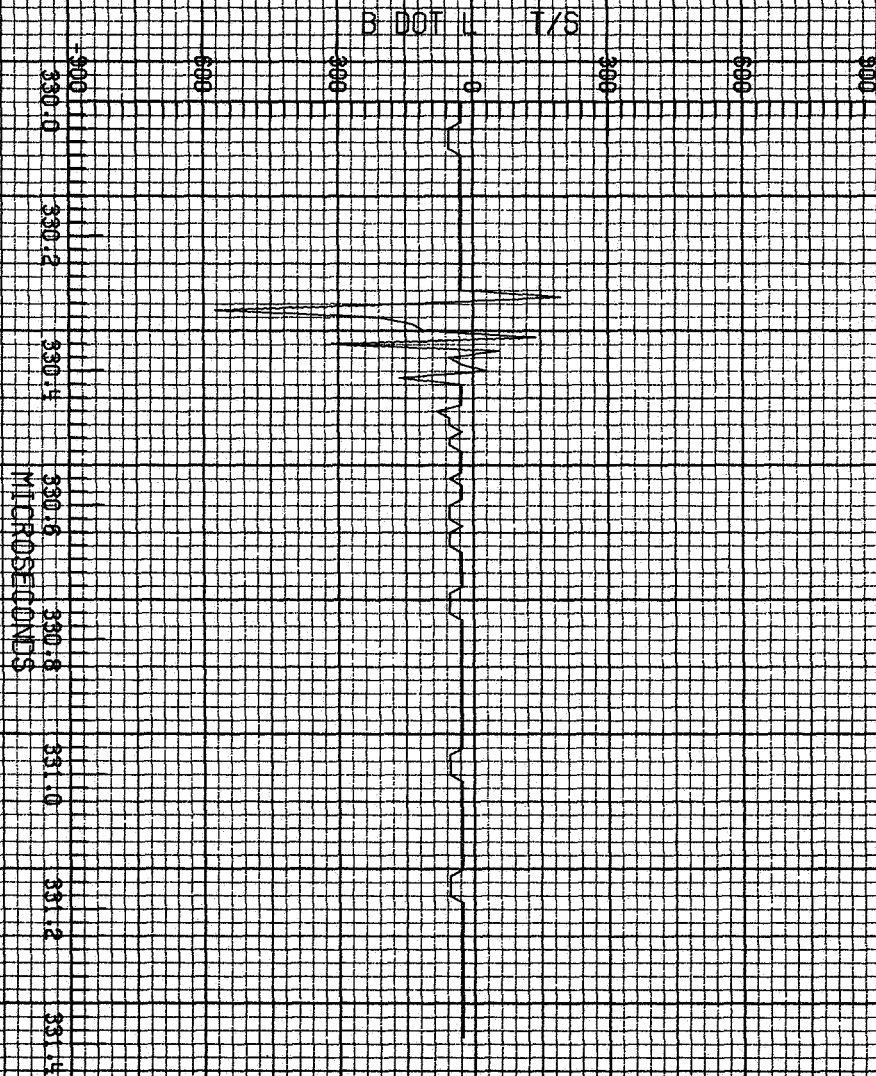


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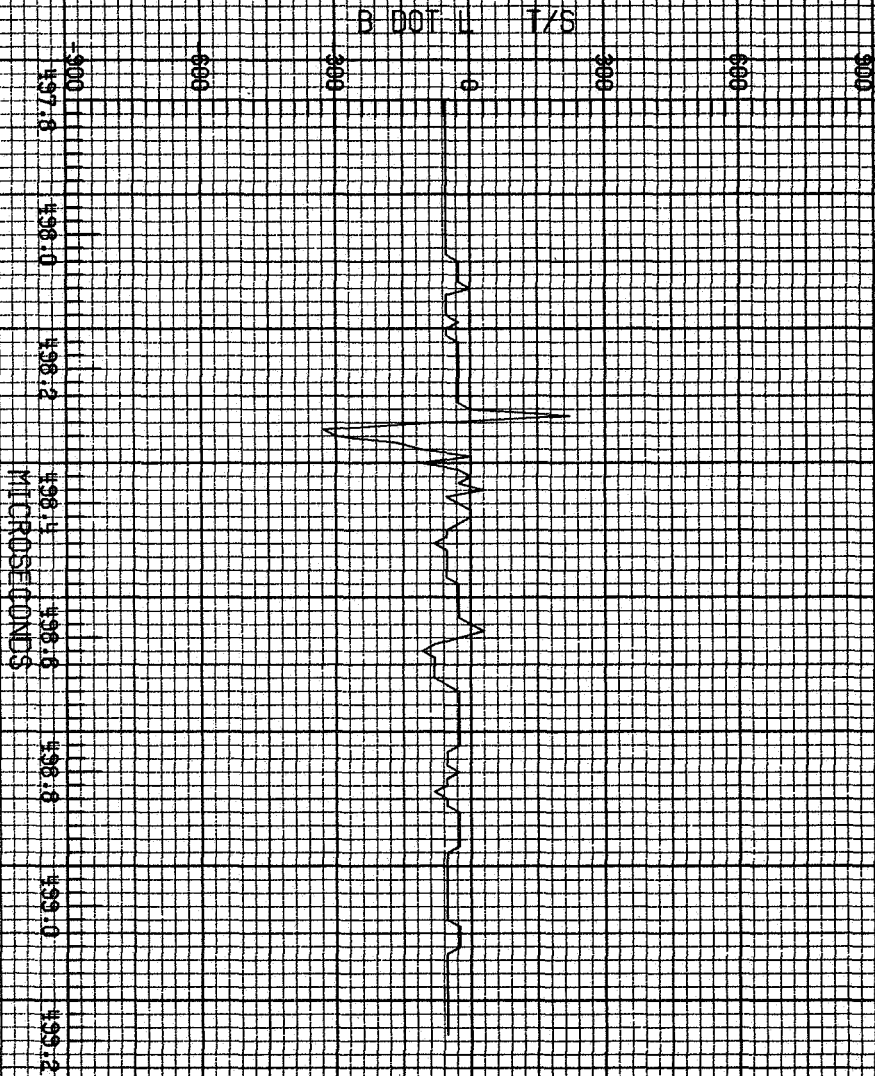


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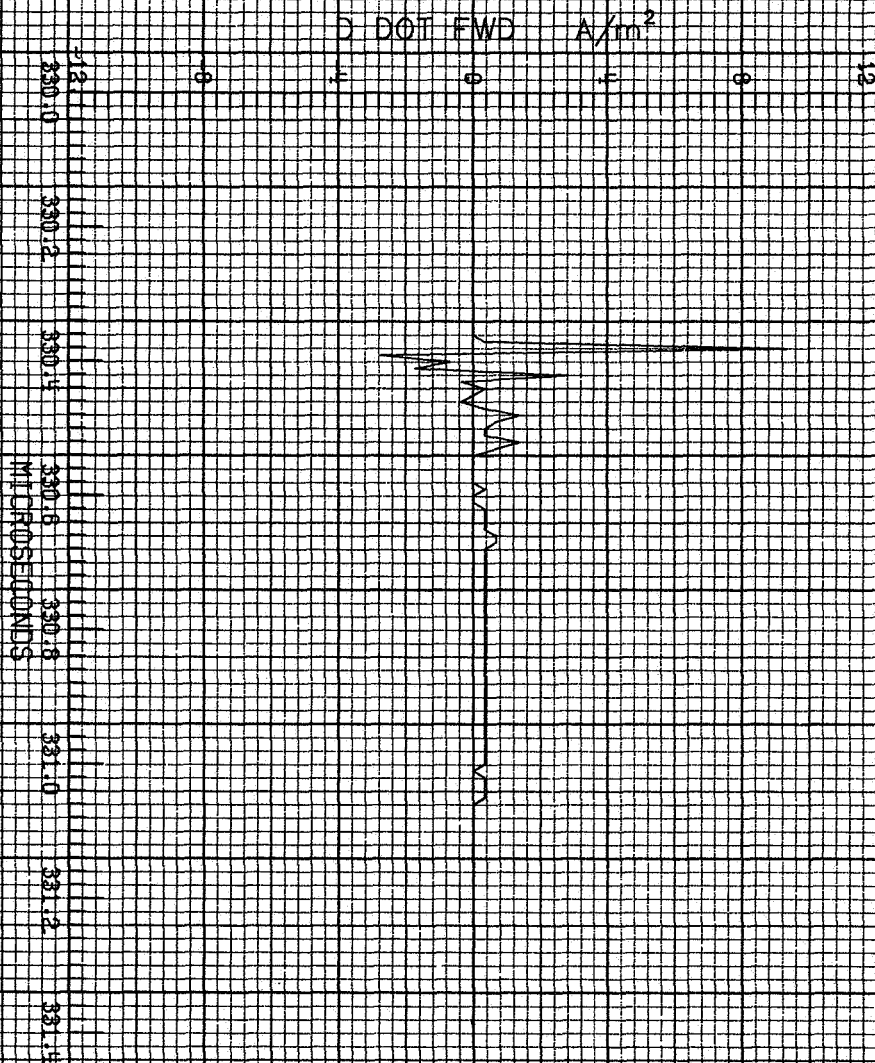


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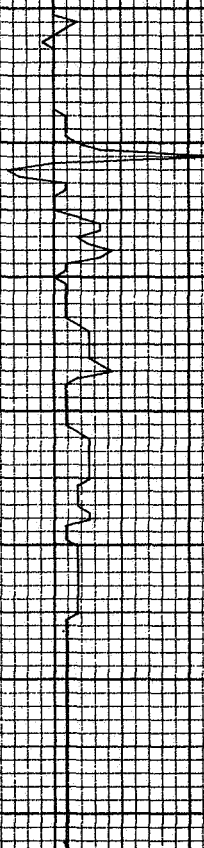
F106 LIGHTNING/FK10/THOMES

TEST NO. 82-G41

RUN NO. 20

D DOT FWD A/m^2

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498.2
498.4
498.6
498.8
499.0
499.2
499.4
MICROSECONDS

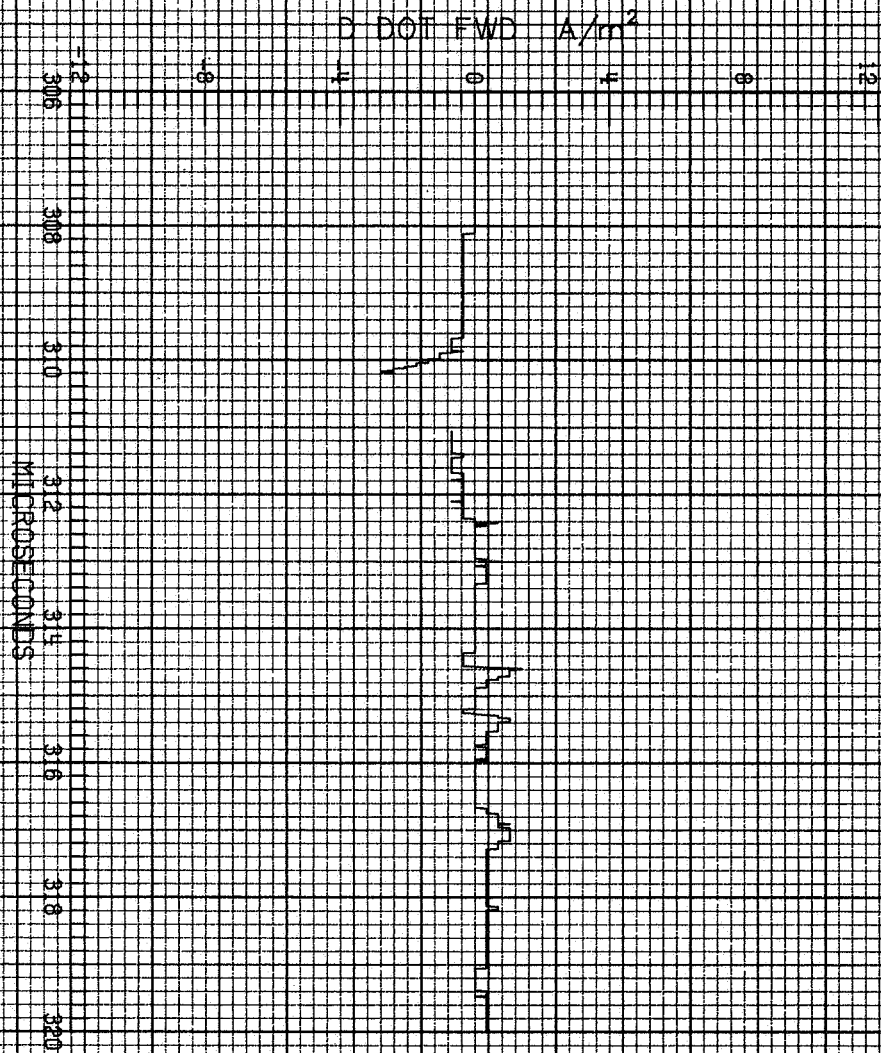


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F106 LIGHTNING/PCM/TK.10/THOMAS

TEST NO. 82-642

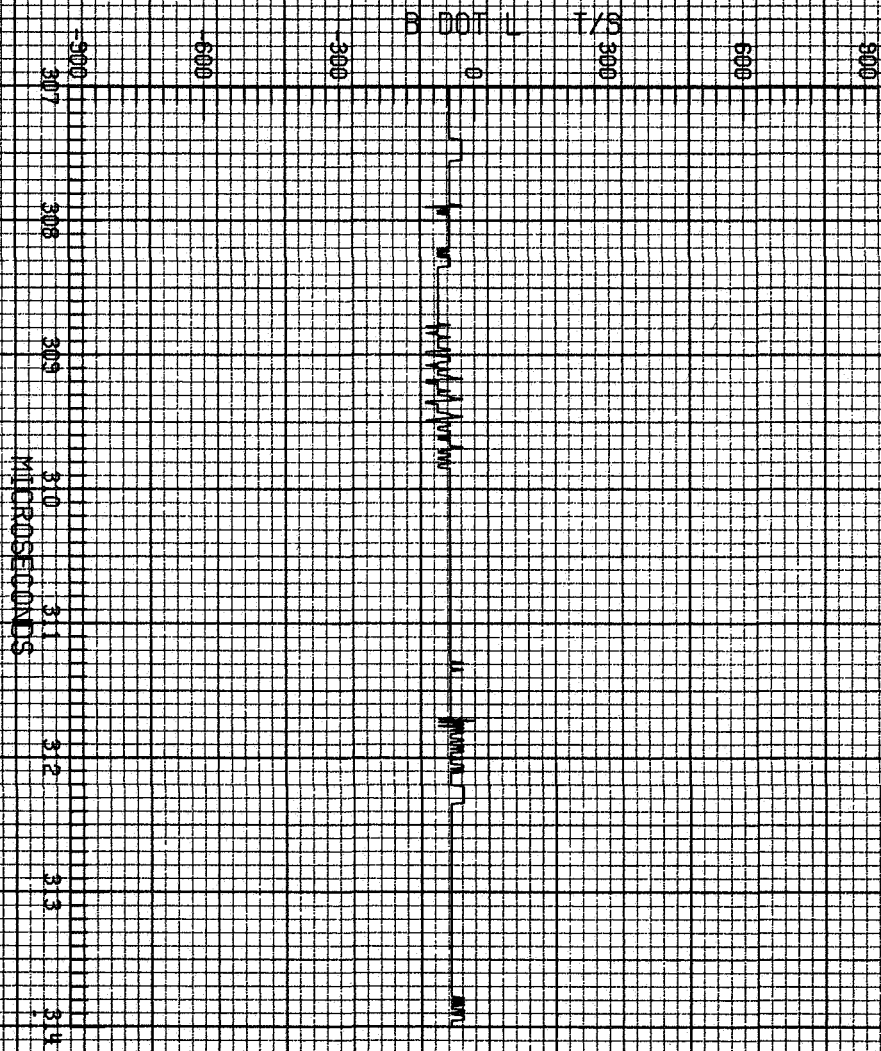
RUN NO. 1



F106 LIGHTNING/PCM/TK.8/THOMAS

TEST NO. 82-042

RUN NO. 1

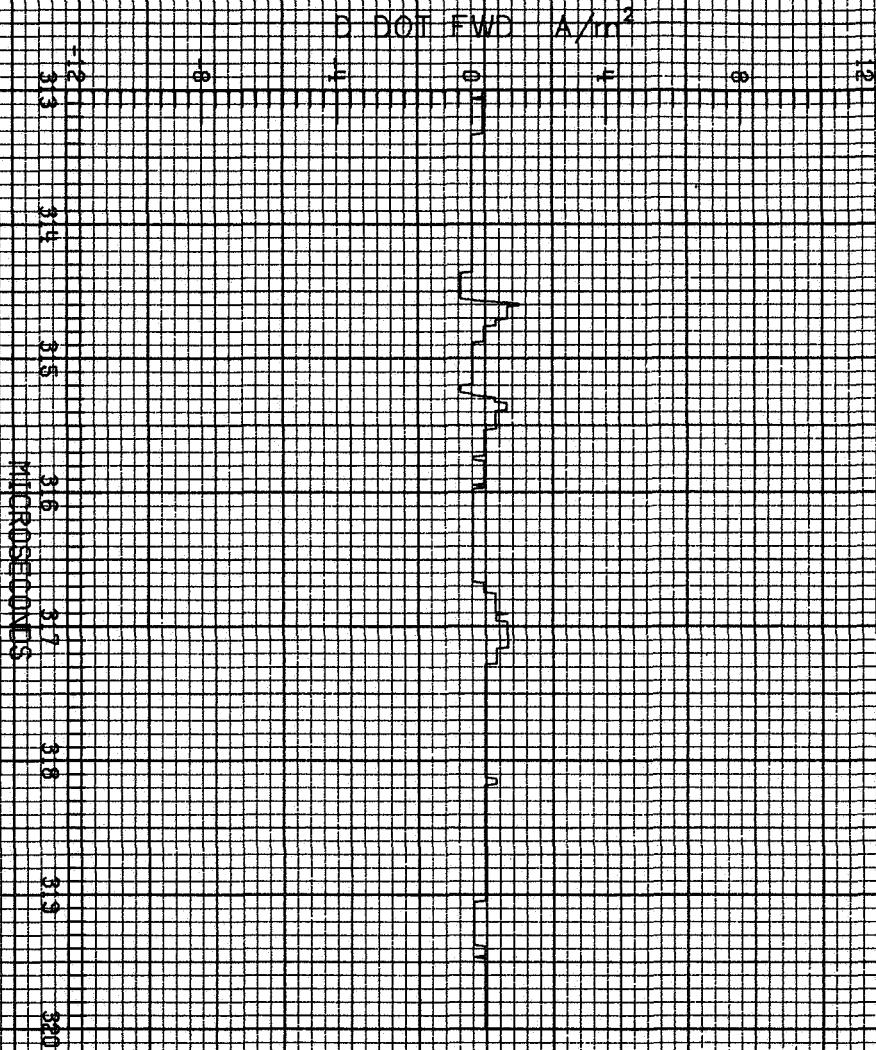


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F106 LIGHTNING/PCM/TK.10/THOMES

TEST NO. 82-042

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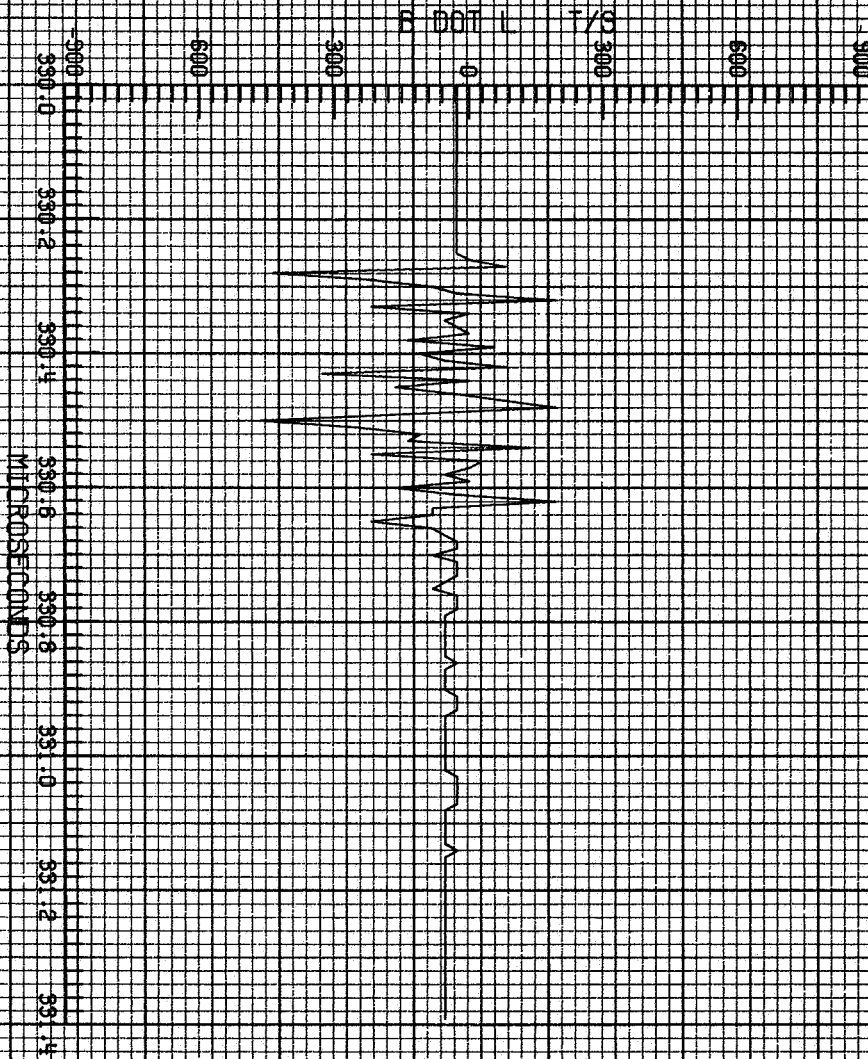


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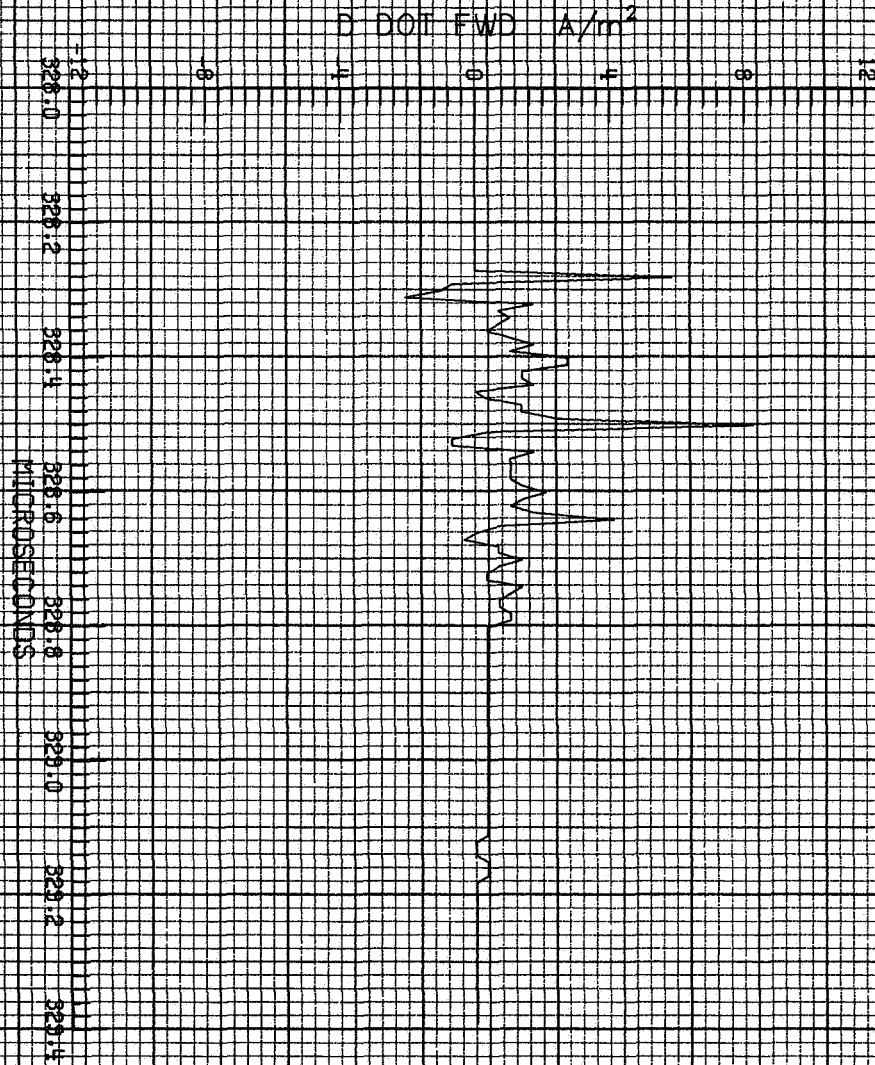
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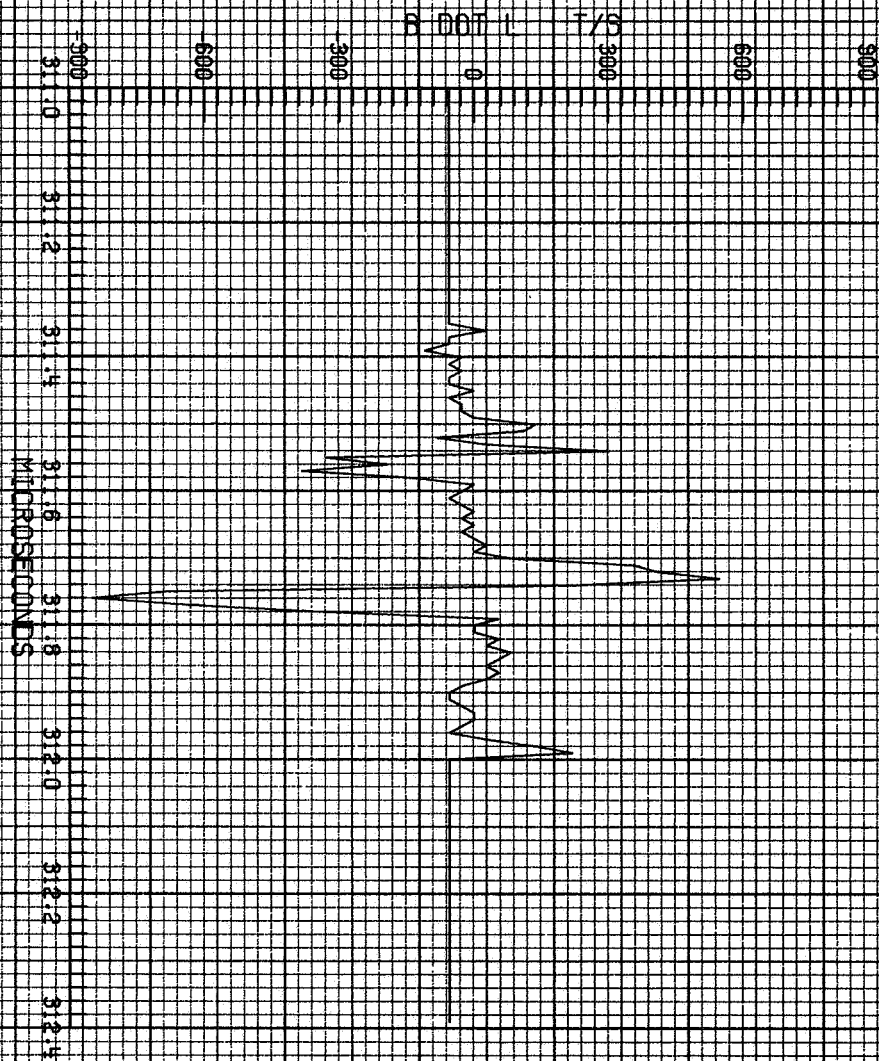
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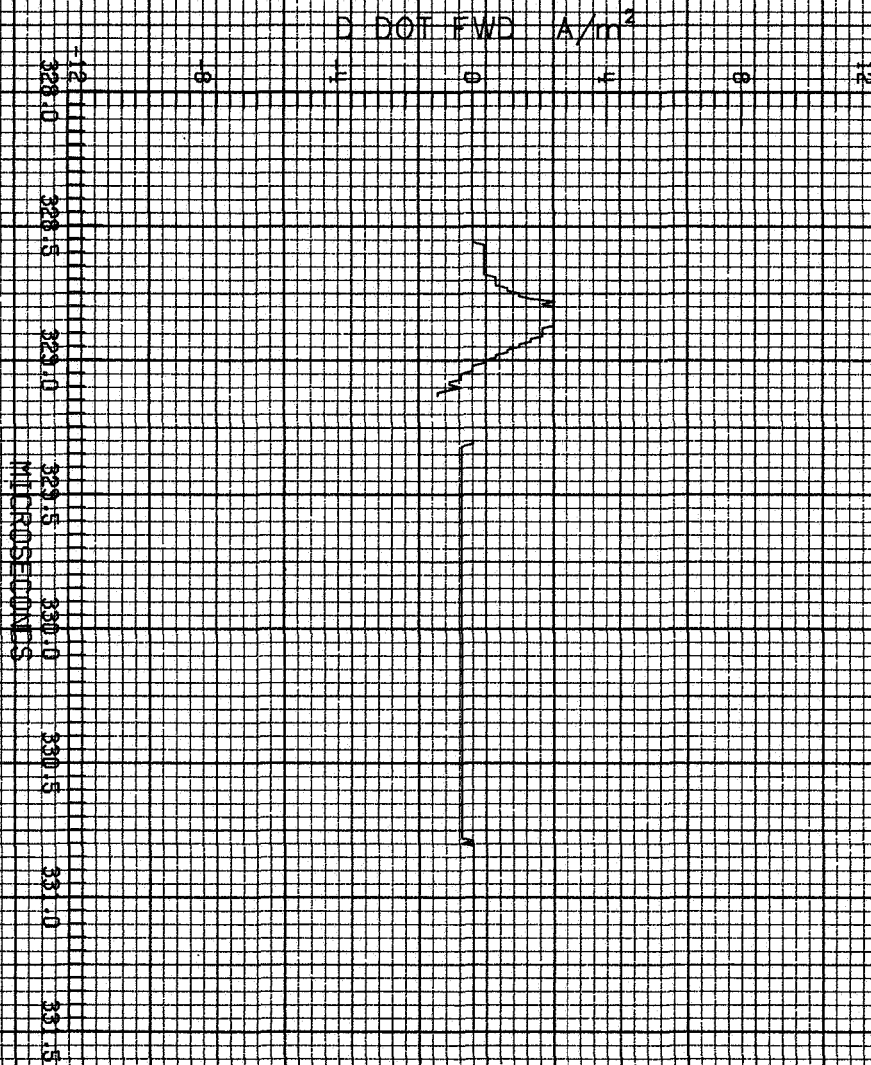
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F106 LIGHTNING/PCM/TK.10/THOMAS

TEST NO. 82-042

RUN NO. 3



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F106 LIGHTNING/PCM/TK.10/THOMBS

TEST NO. 82-042

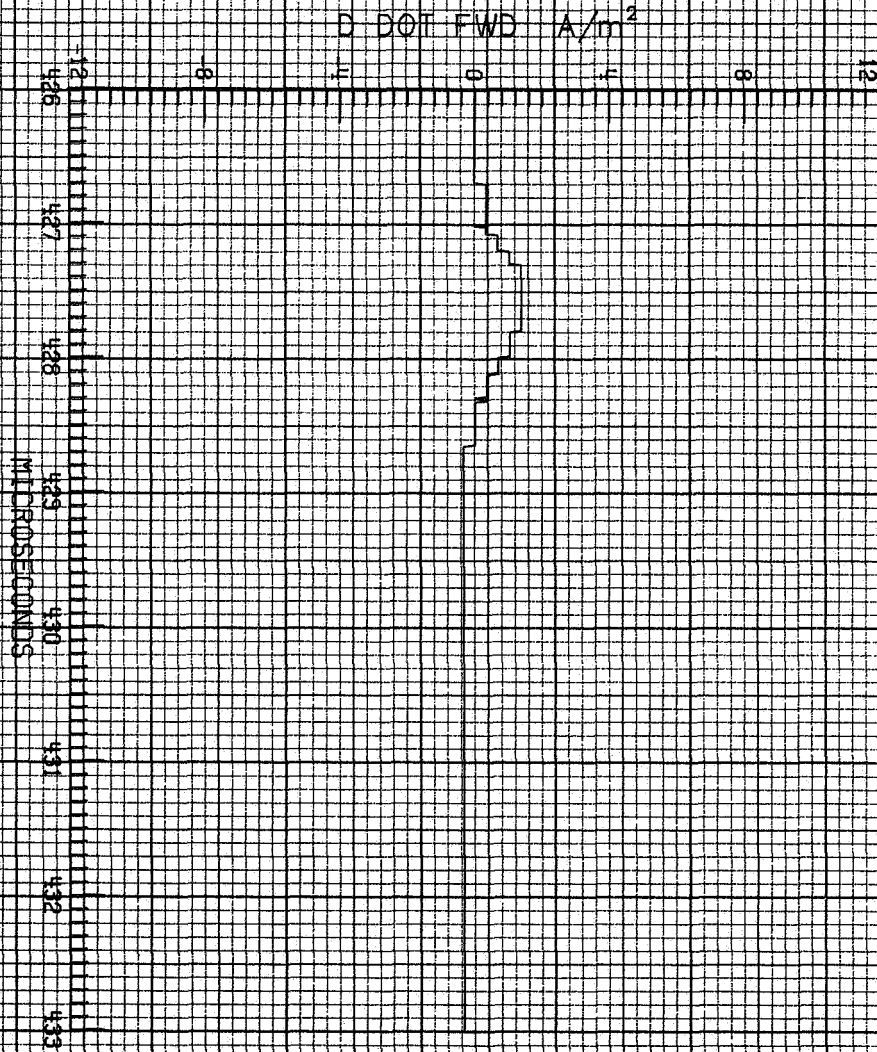
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F106 LIGHTNING/PCM/TK.10/THOMAS

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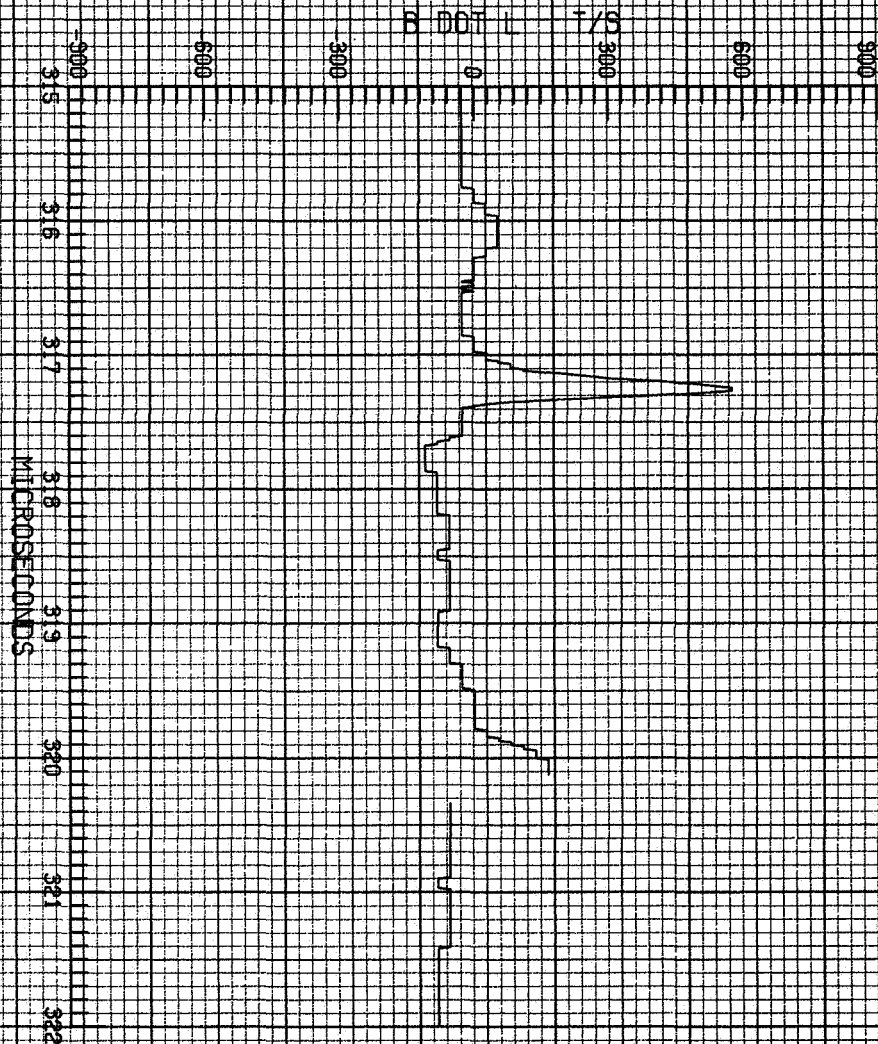
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F106 LIGHTNING/PCM/TK.8/THOMBS

TEST NO. 82-042

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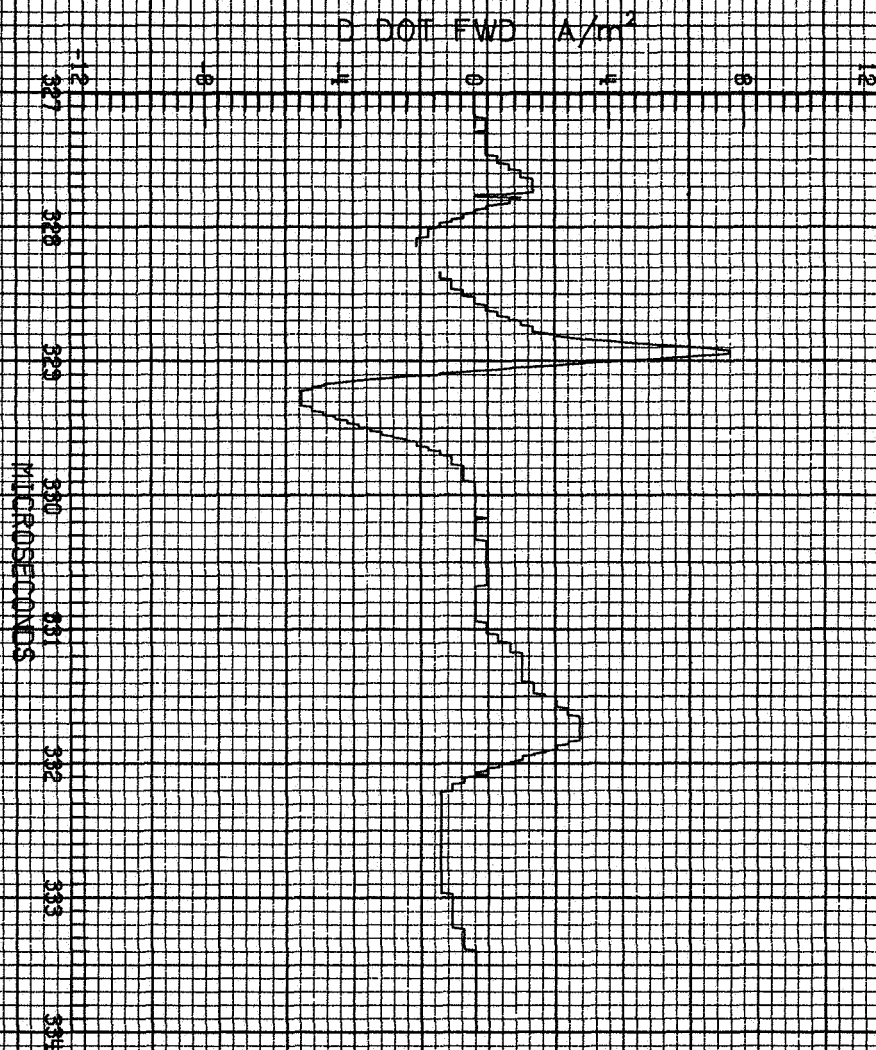


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F106 LIGHTNING/PCM/TK.10/THOMAS

TEST NO. 82-042

RUN NO. 4

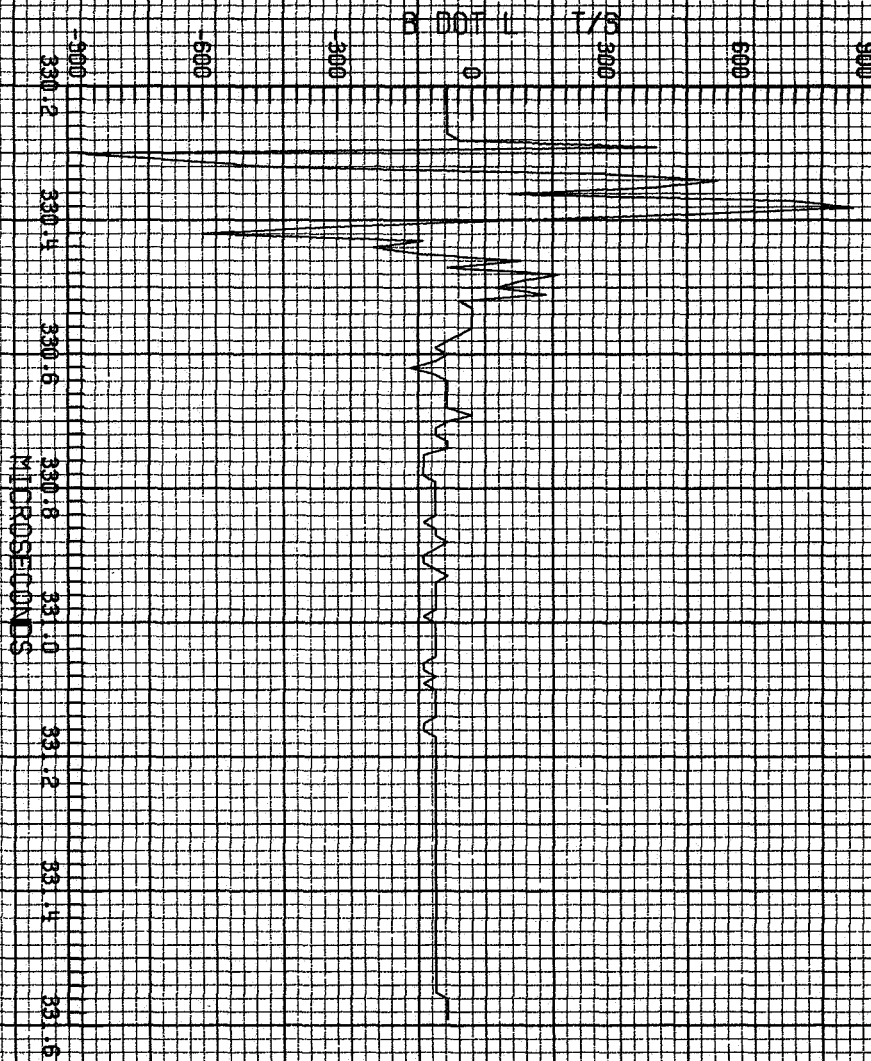


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F106 LIGHTNING/PCM/TK.8/THOMAS

TEST NO. 82-042

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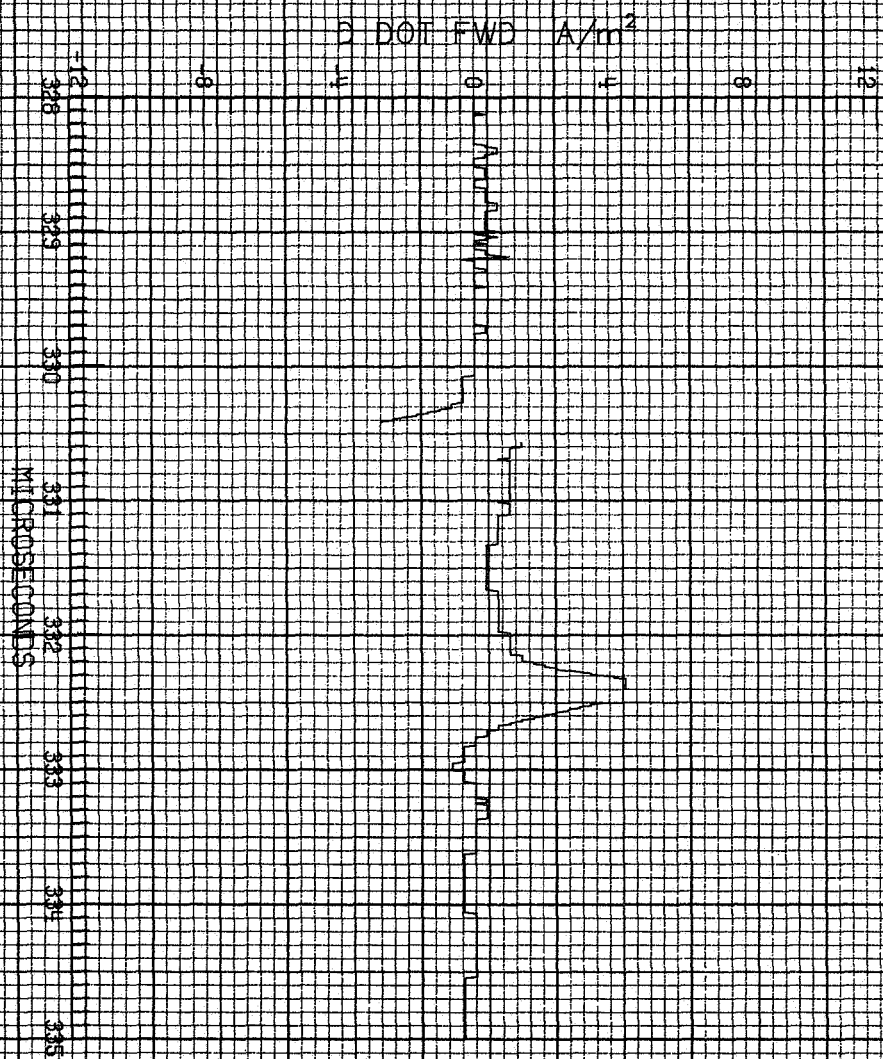


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TEST NO. 82-042

RUN NO. 5

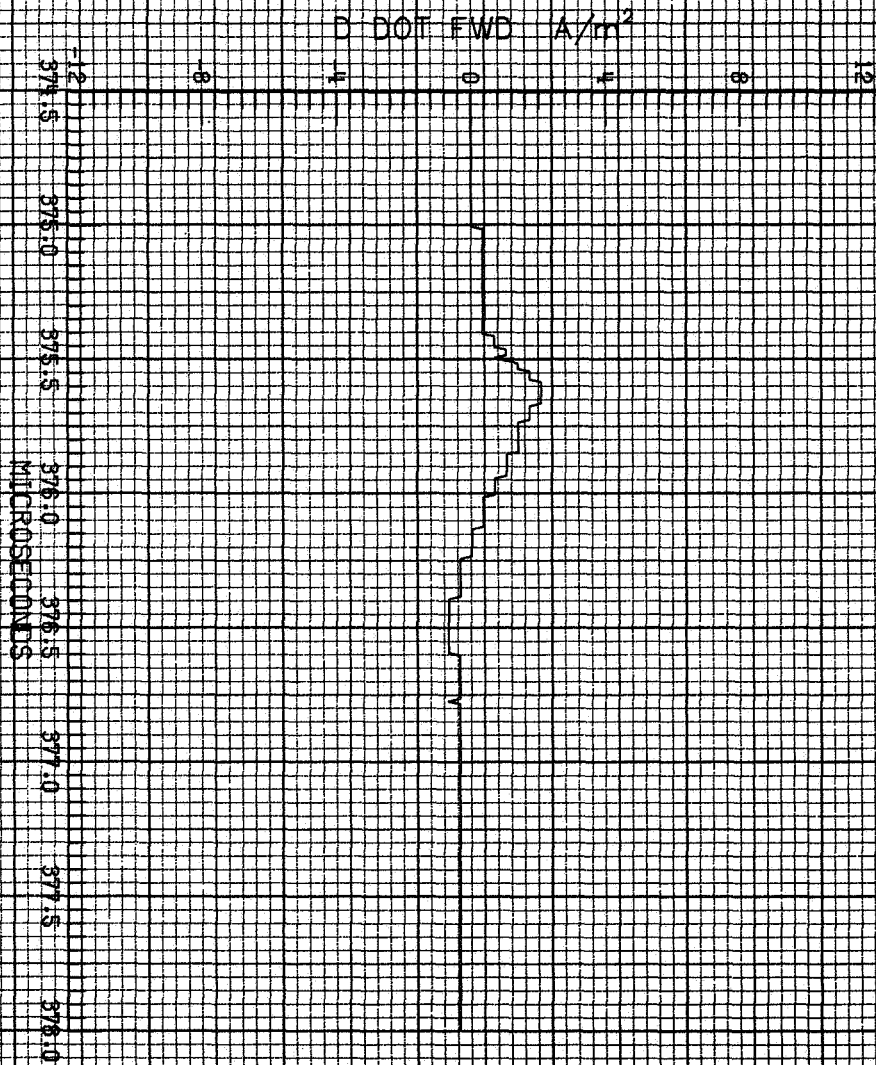


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F106 LIGHTNING/PCM/TK.10/THOMES

TEST NO. 82-042

RUN NO. 5

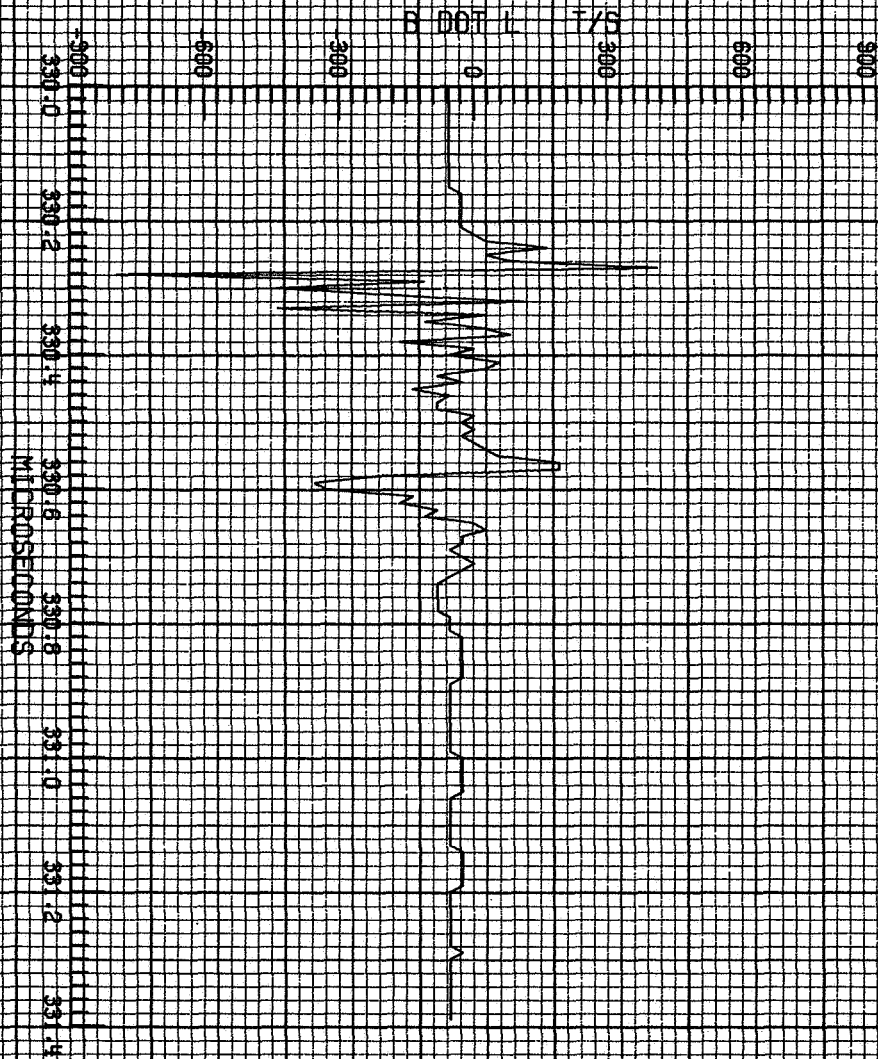


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F106 LIGHTNING/PCM/TK-8/THOMPS

TEST NO. 82-042

RUN NO. 6

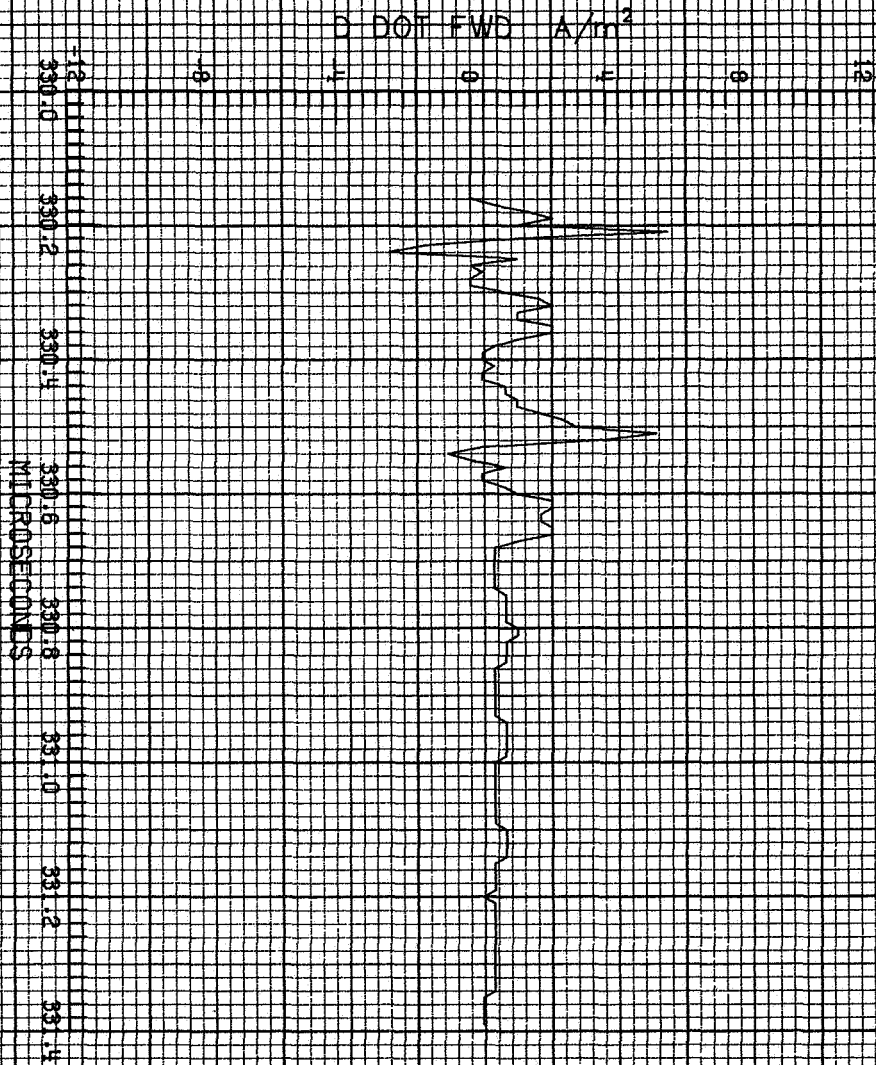


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TEST NO. 82-042

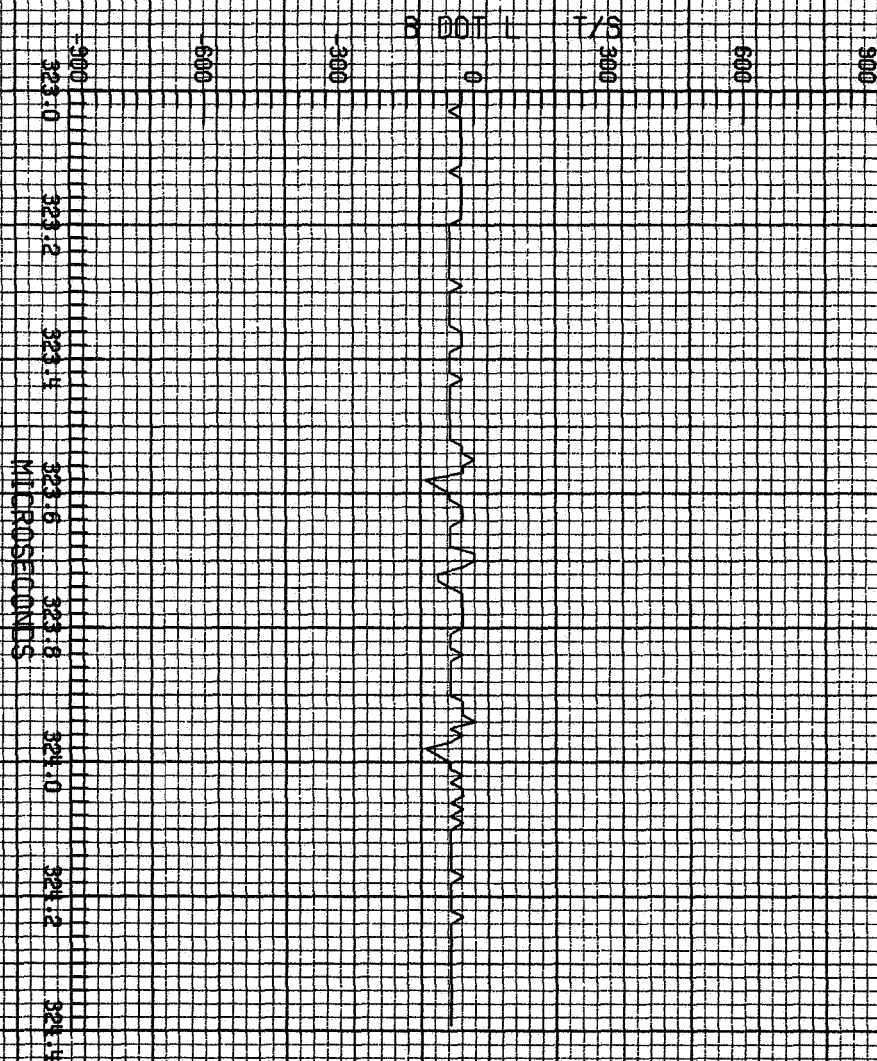
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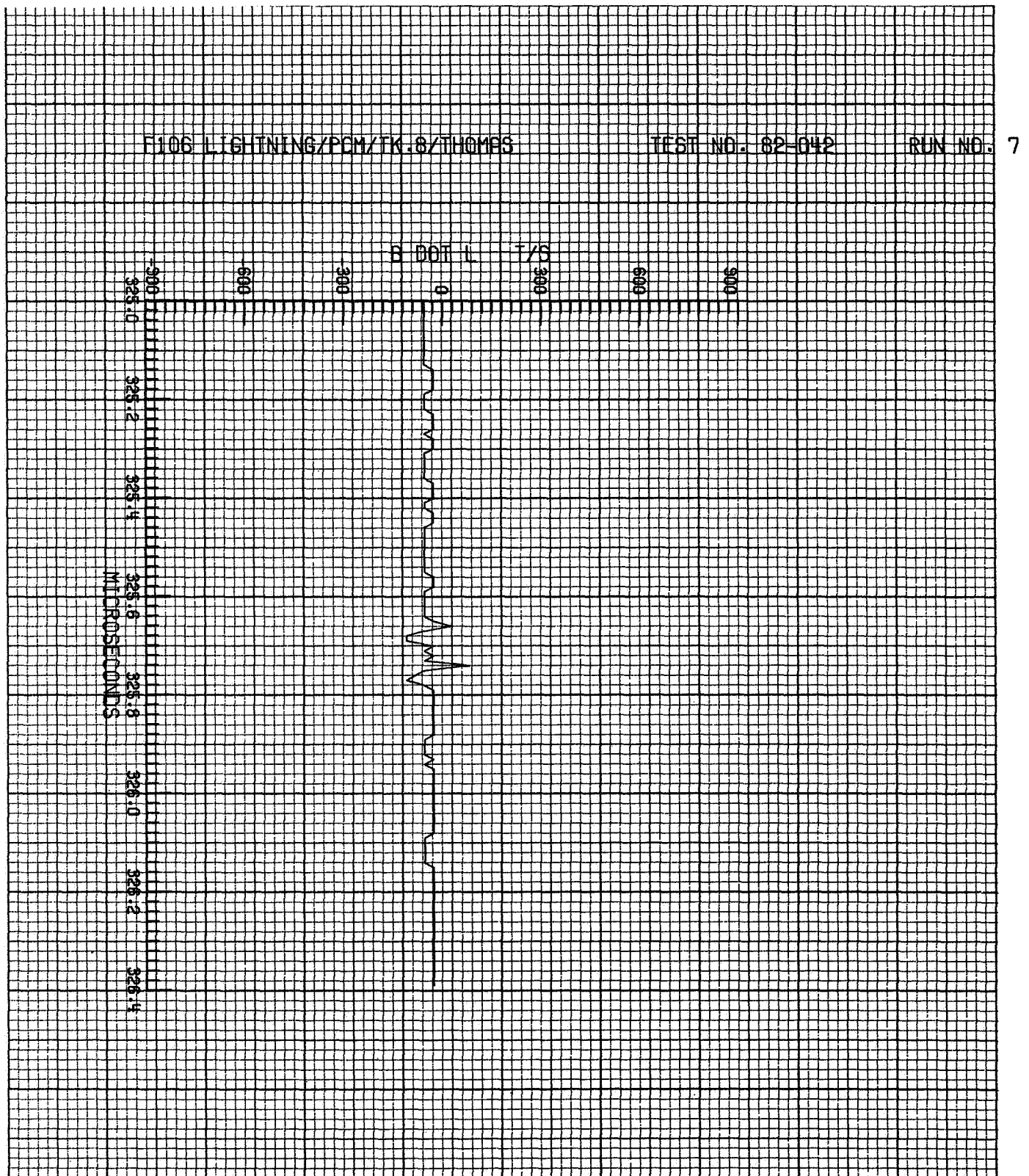
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TEST NO. 82-042

RUN NO. 7



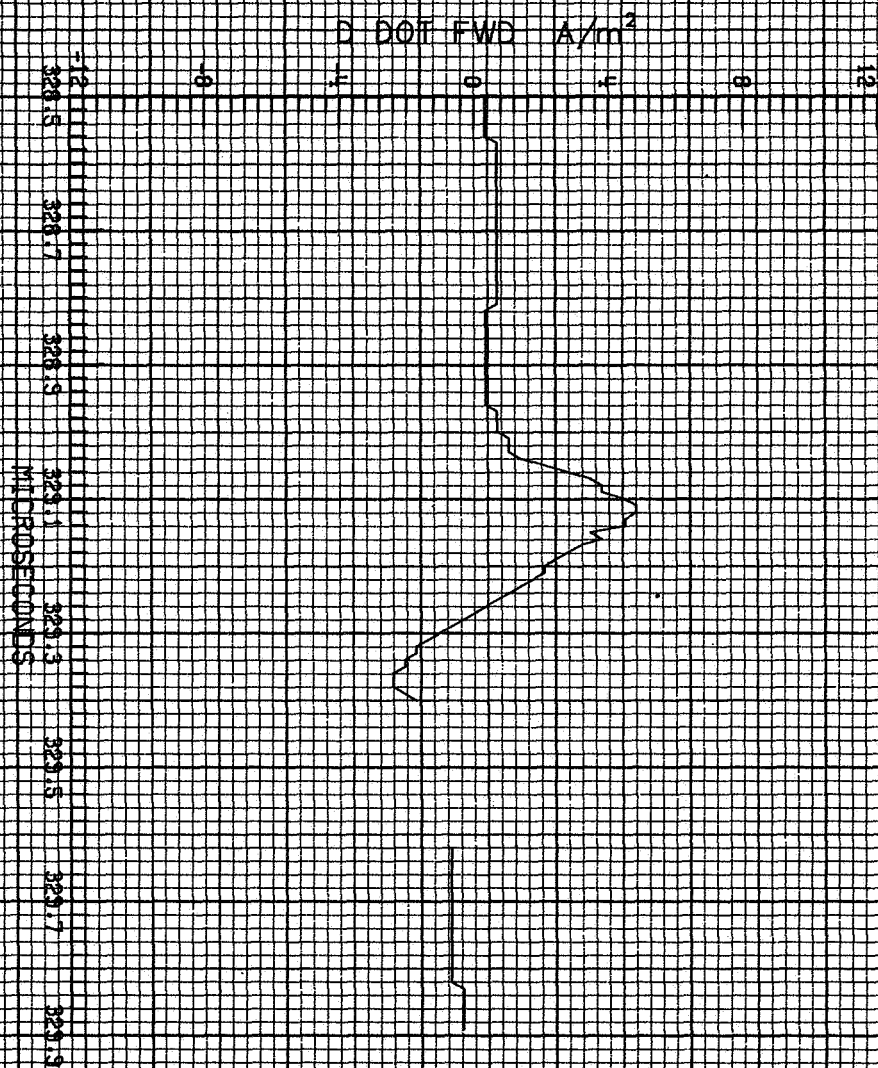
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F106 LIGHTNING/PCM/TK-10/THOMAS

TEST NO. 82-042

RUN NO. 7

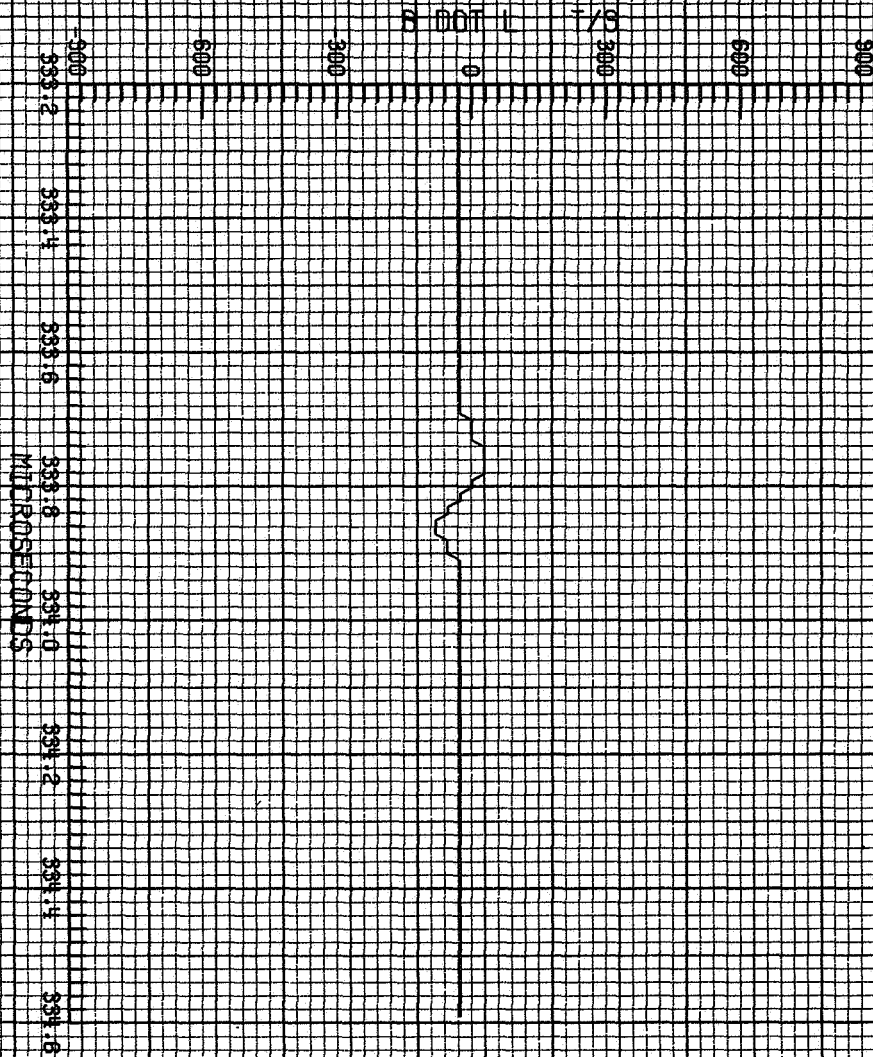


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F106 LIGHTNING/PCM/TK.8/THOMBS

TEST NO. 82-042

RUN NO. 7

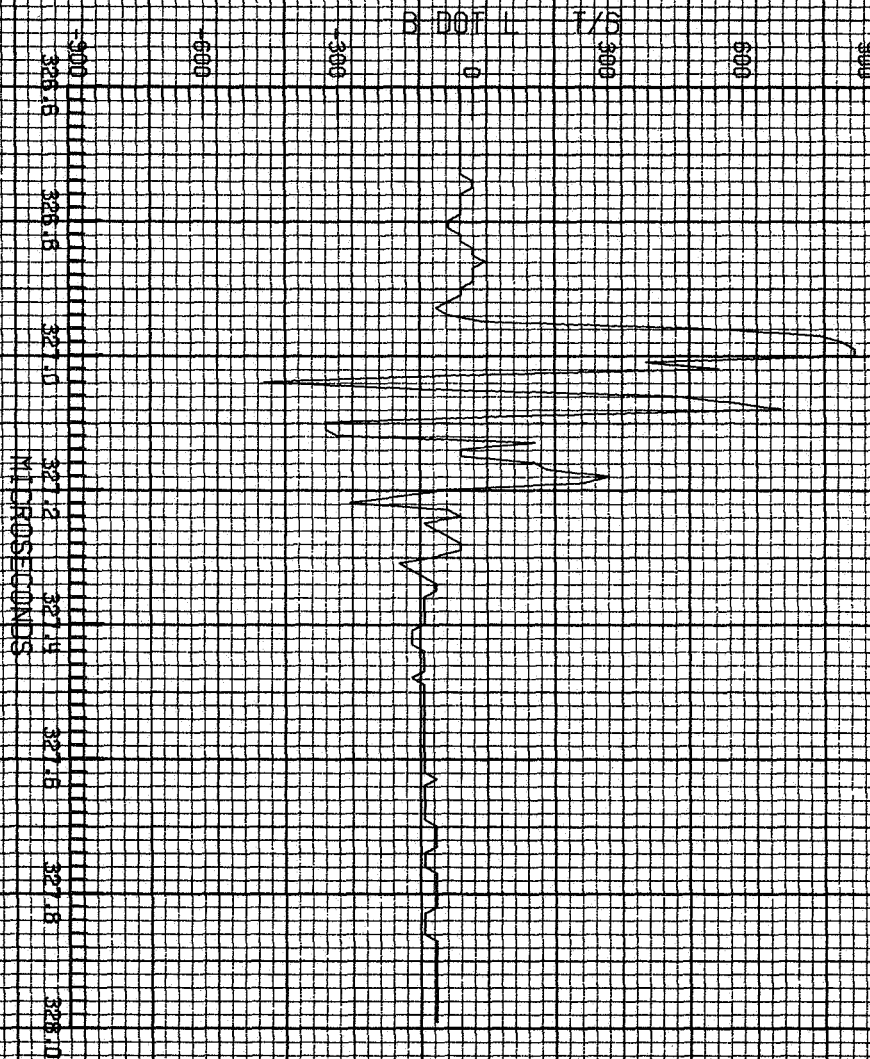


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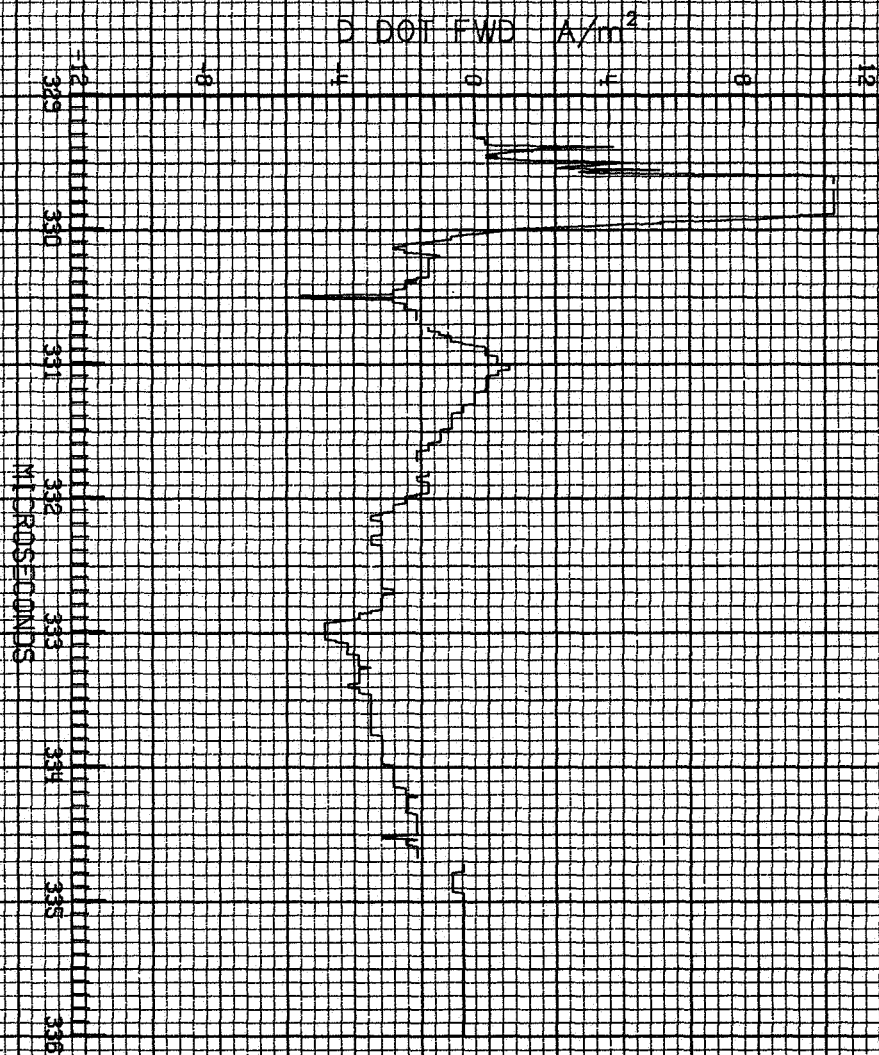
TEST NO. 82-042

RUN NO. 8



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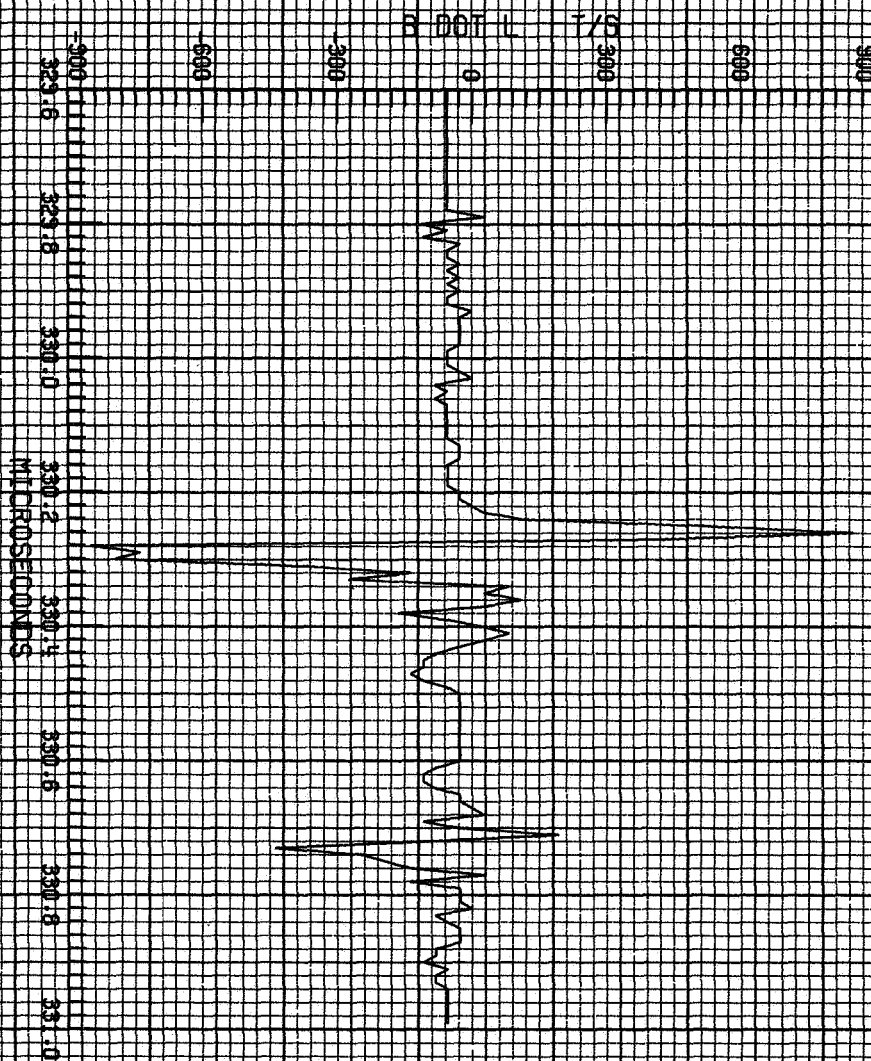


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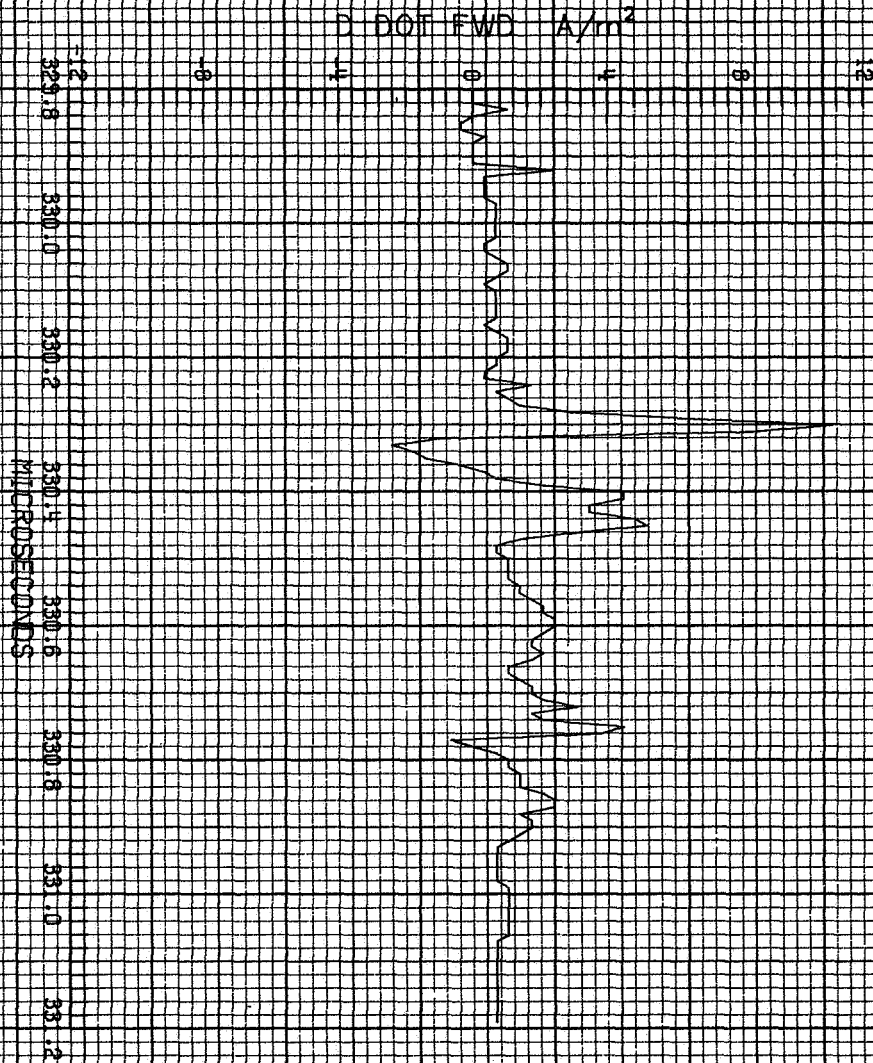
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F106 LIGHTNING/PCM/TK-10/THOMAS

TEST NO. 82-042

RUN NO. 9

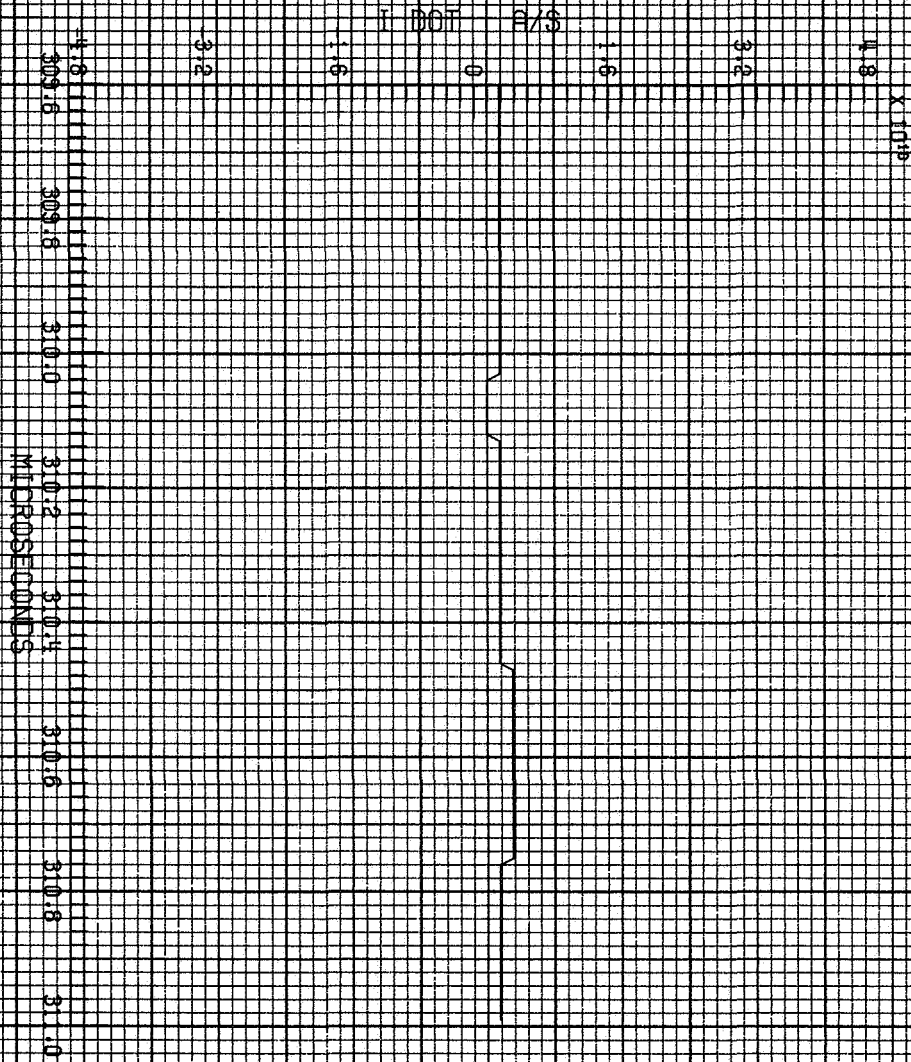


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F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-043

RUN NO. 1

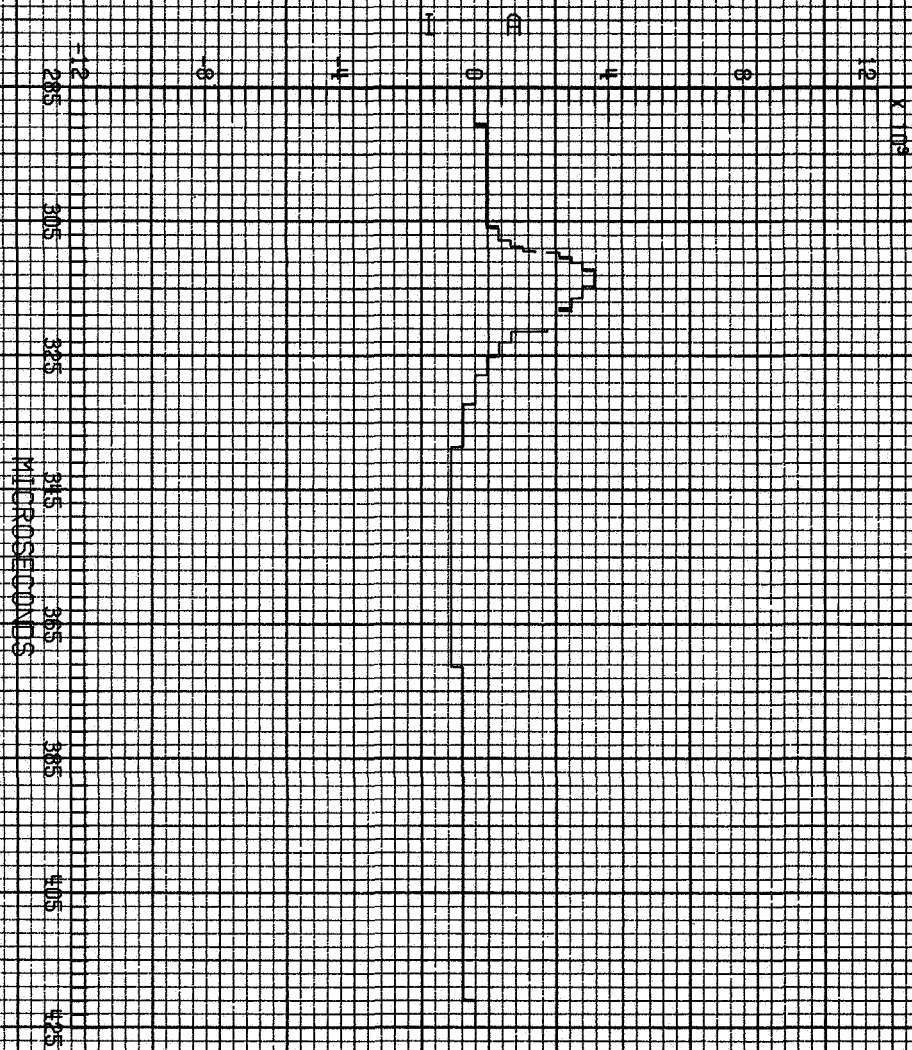


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F106 LIGHTNING/TK10/THOMBS

TEST NO. 82-043

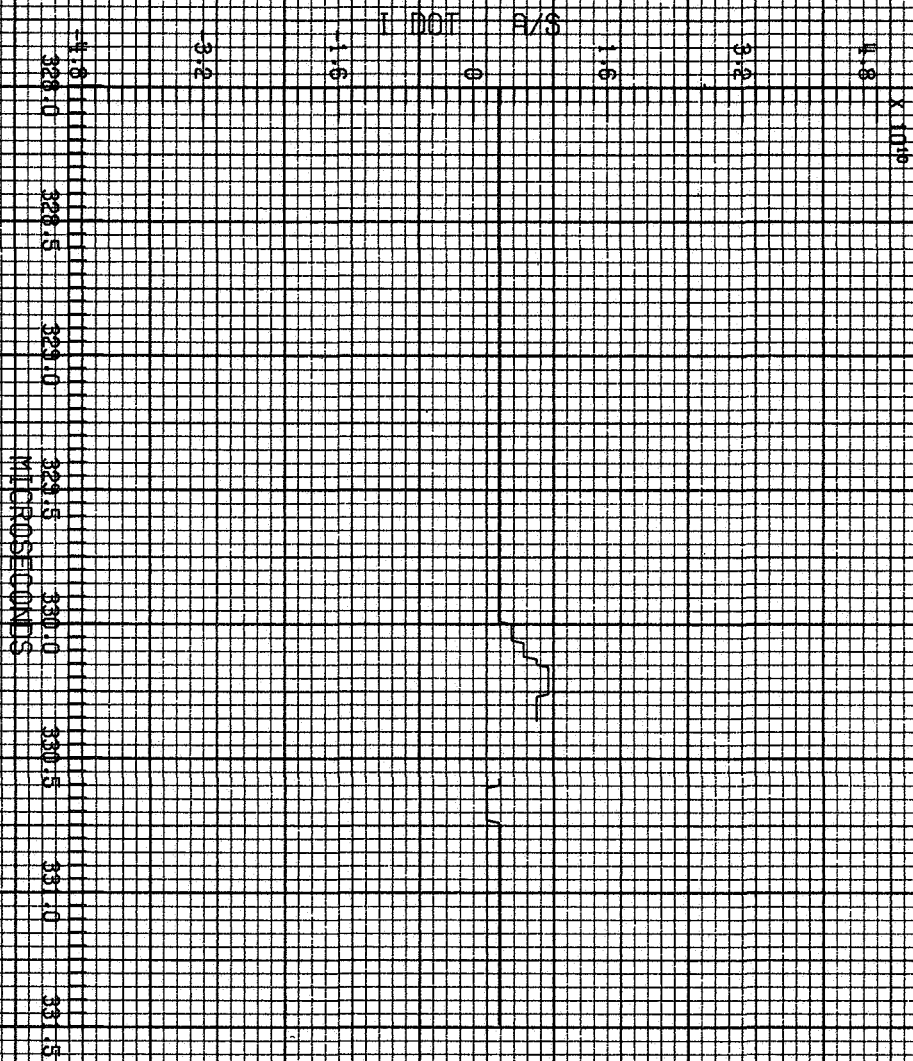
RUN NO. 1



F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-043

RUN NO. 2

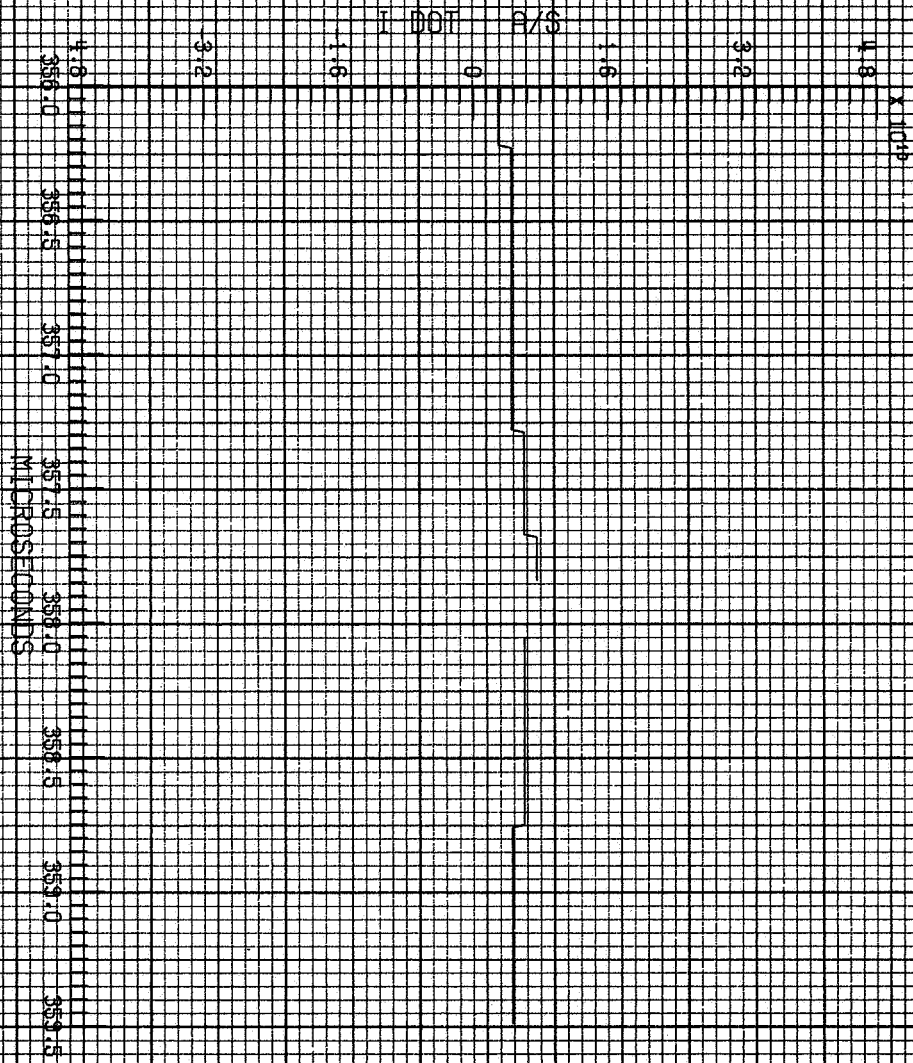


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F106 LIGHTNING/TK 8/THOMAS

TEST NO. 82-043

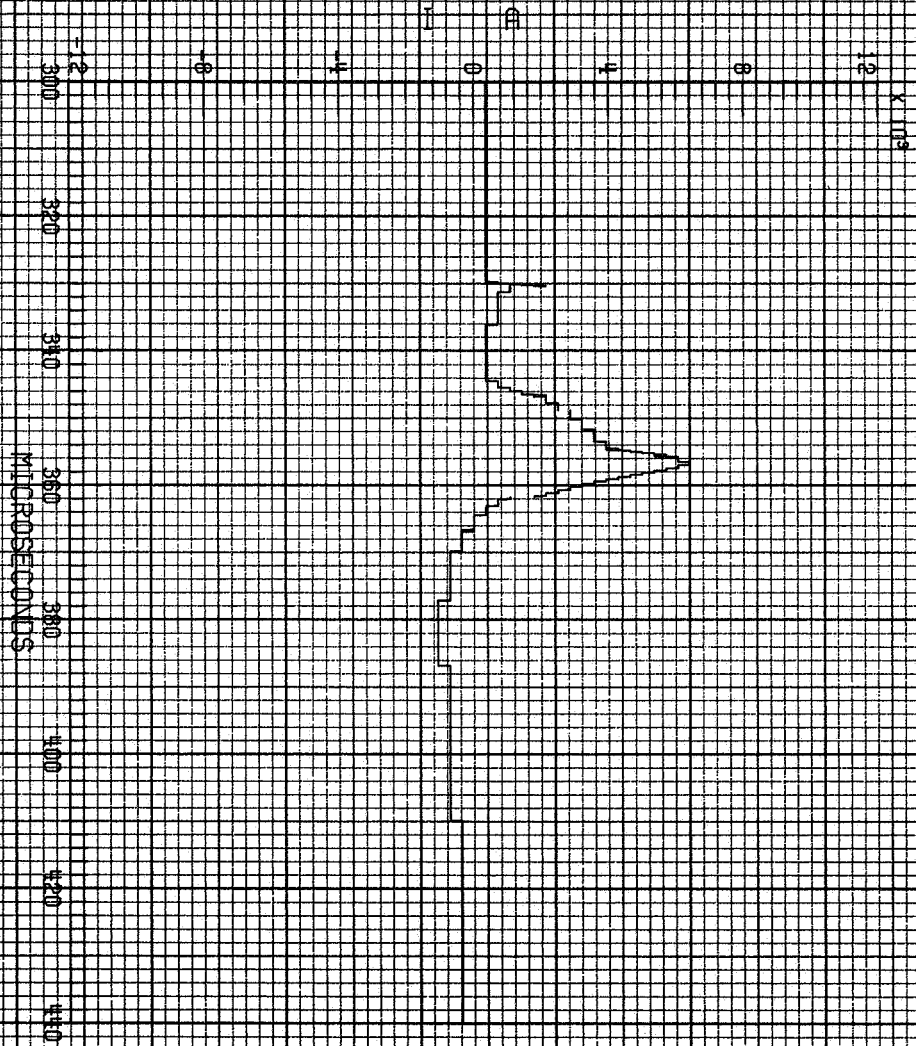
RUN NO. 2



F106 LIGHTNING/TK10/THOMAS

TEST NO. 82-043

RUN NO. 2

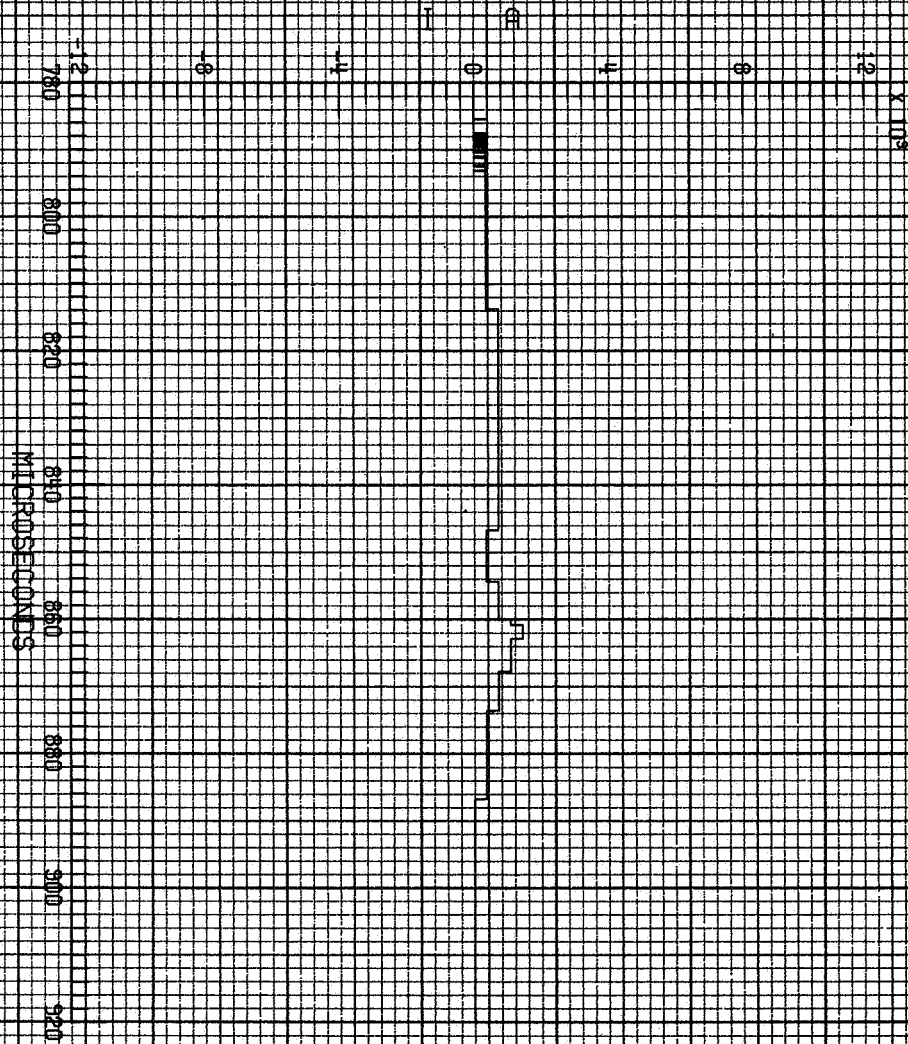


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F106 LIGHTNING/TK10/THOMAS

TEST NO. 82-043

RUN NO. 2

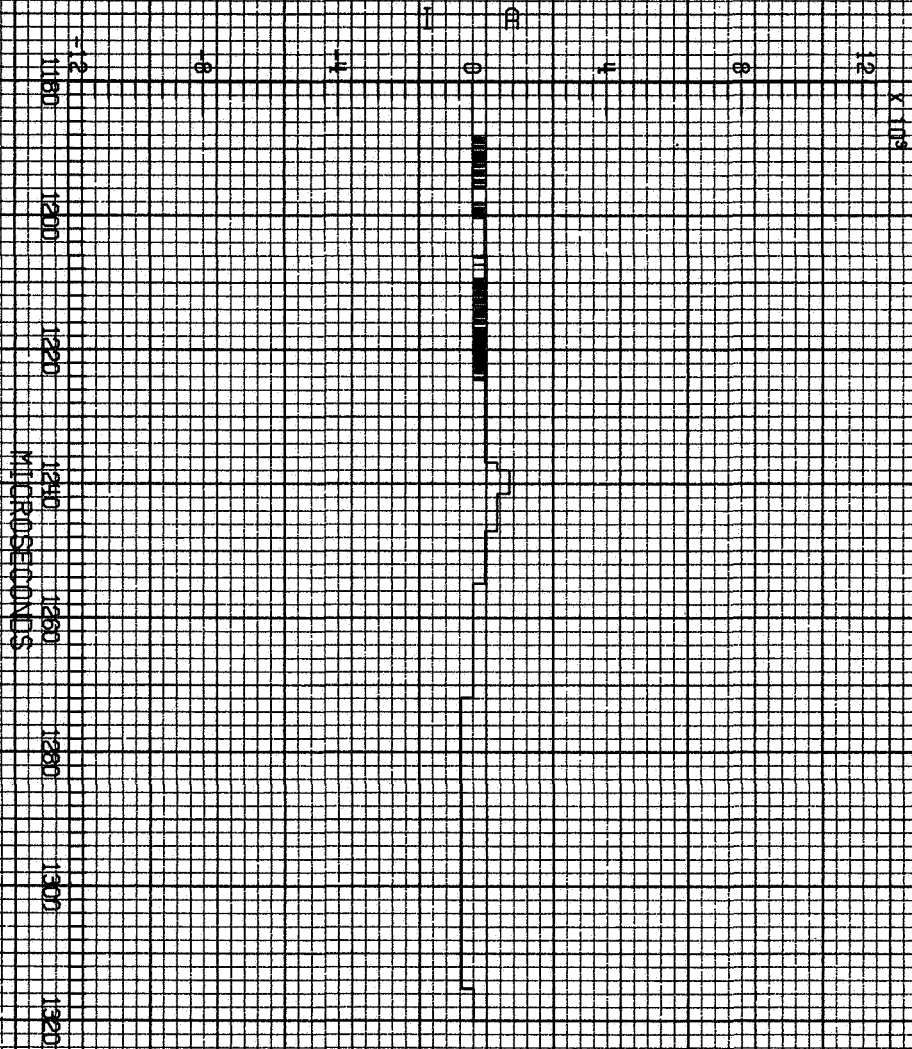


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F106 LIGHTNING/TK10/THOMAS

TEST NO. 82-043

RUN NO. 2

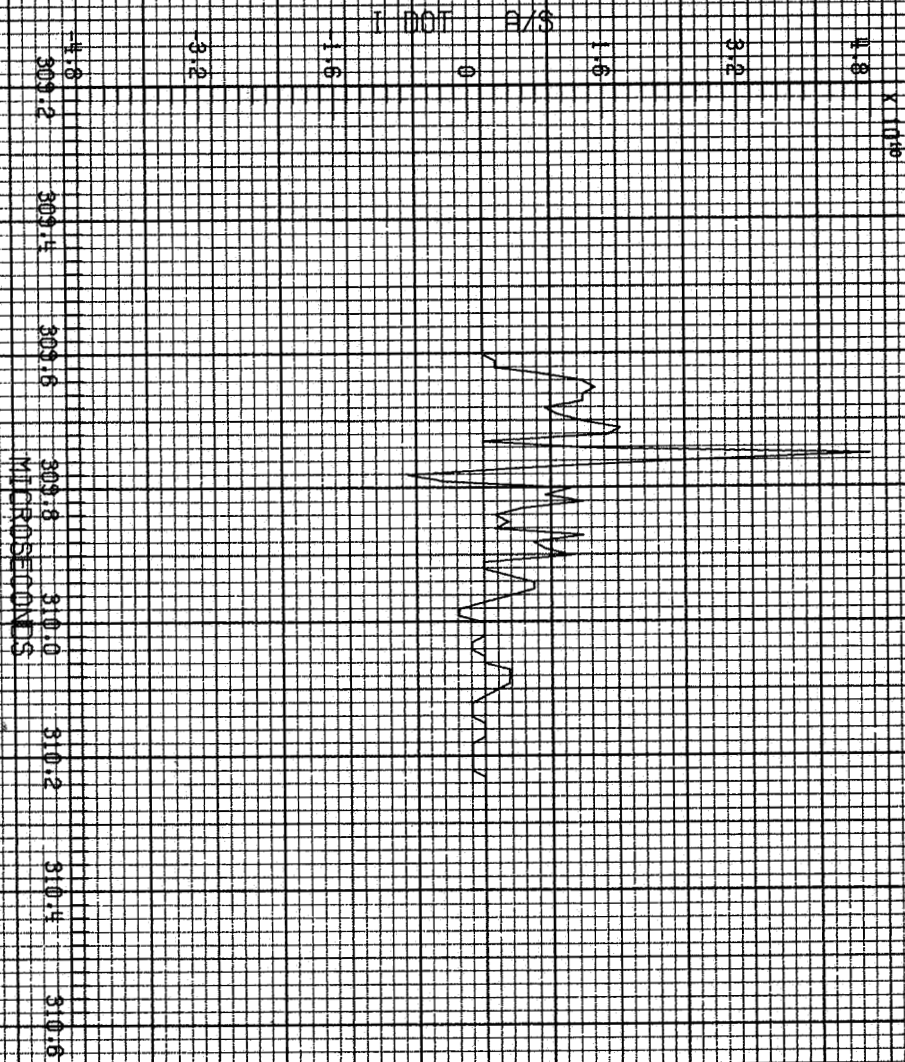


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F106 LIGHTNING/PCM/TK8/M. THOMAS

TEST NO. 82-044

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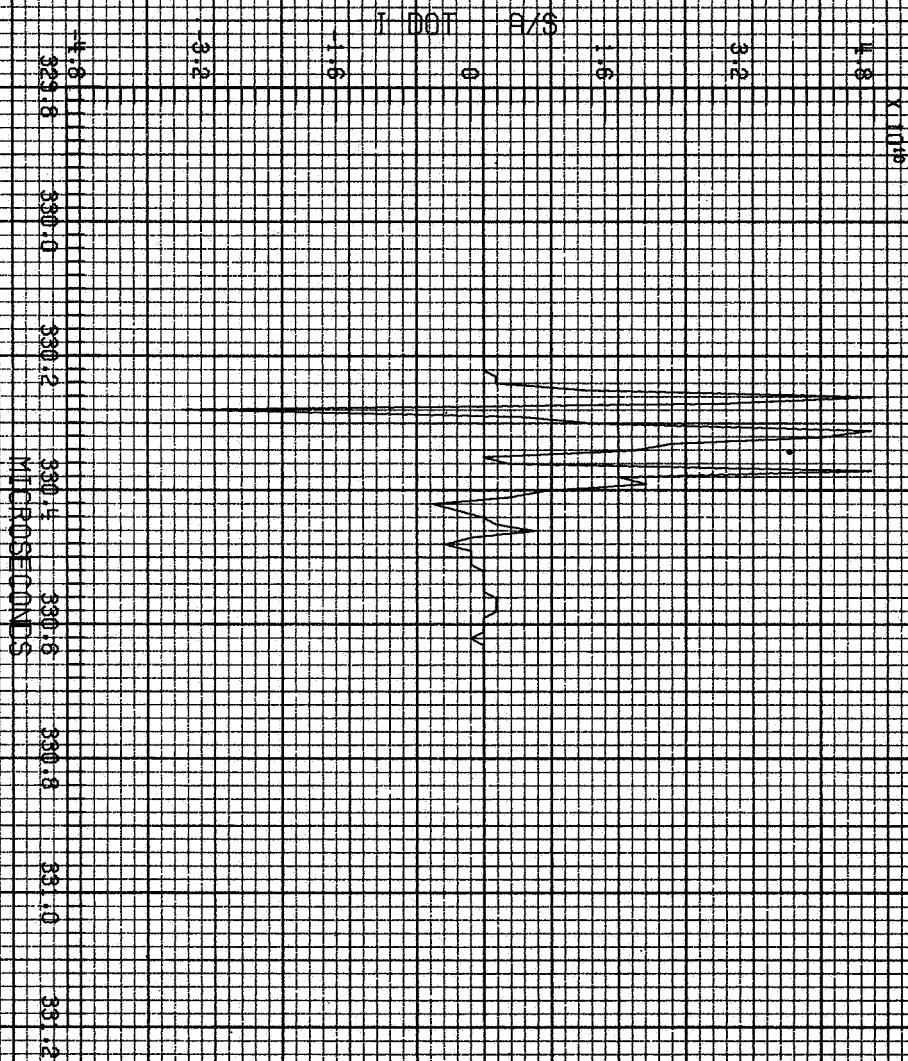


RUN NO. 1

F106 LIGHTNING/PCM/TK8/M.THOMAS

TEST NO. 82-044

RUN NO. 2

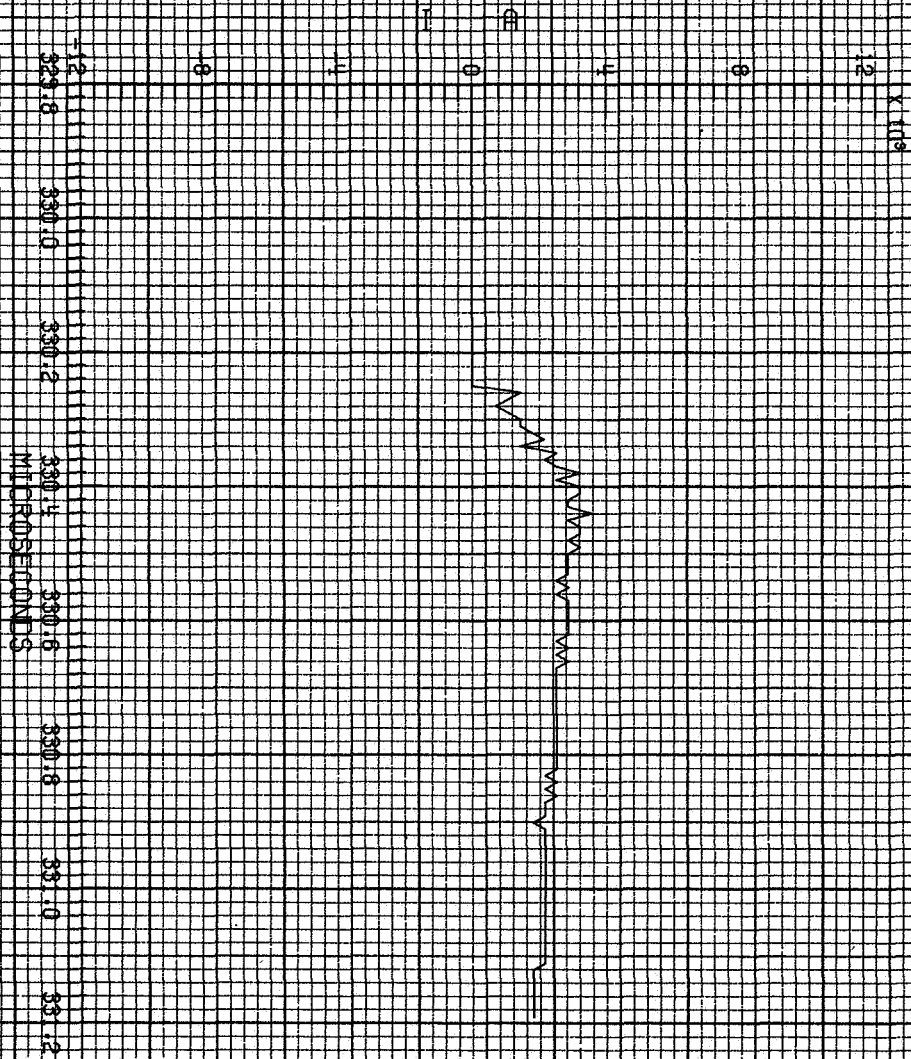


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F106 LIGHTNING/PCM/TK10/M. THOMAS

TEST NO. 82-044

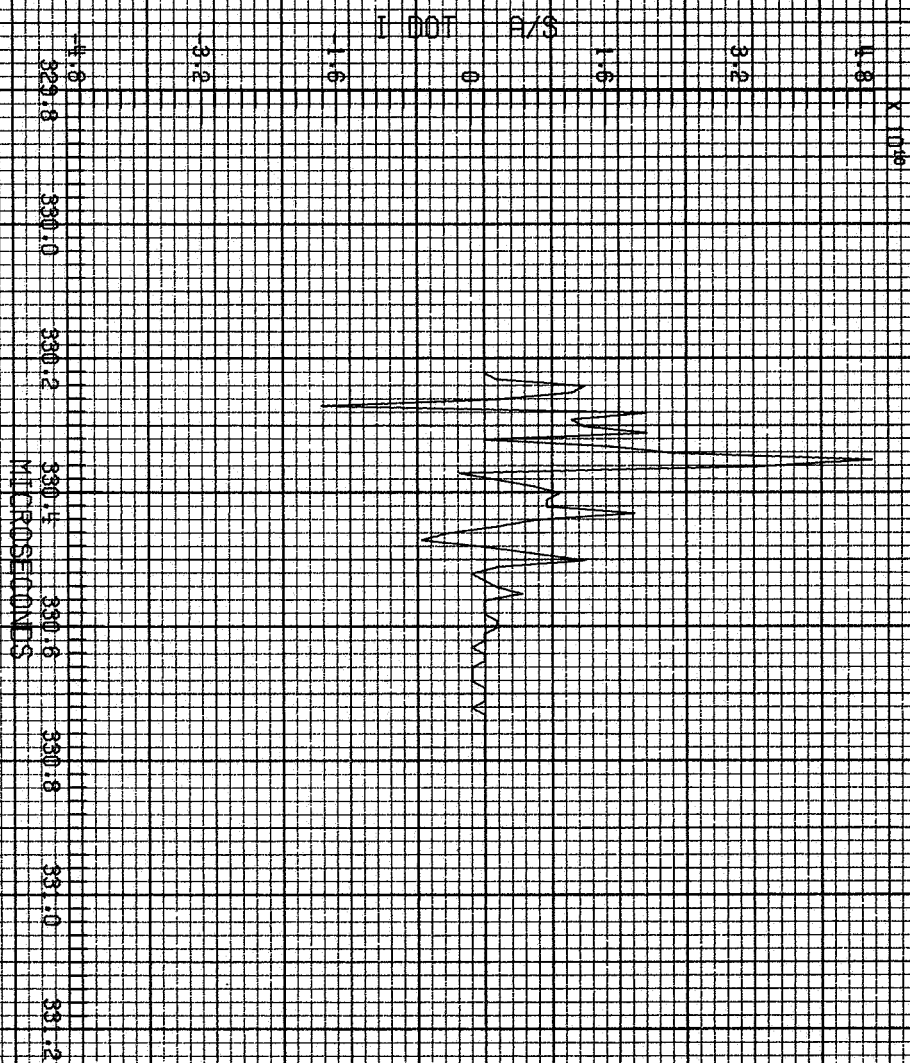
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3

TEST NO. 82-044

RIN NO.

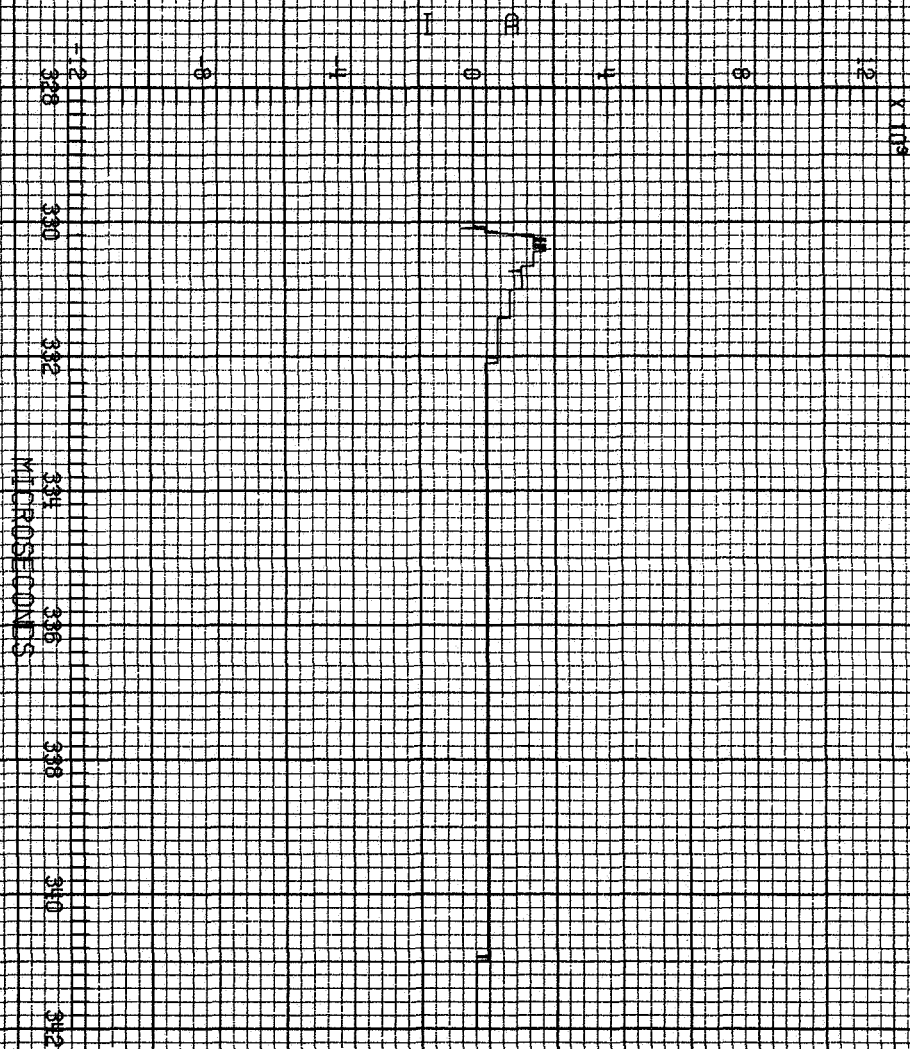


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F106 LIGHTNING/PCM/TK10/M. THOMAS

TEST NO. 82-044

RUN NO. 3

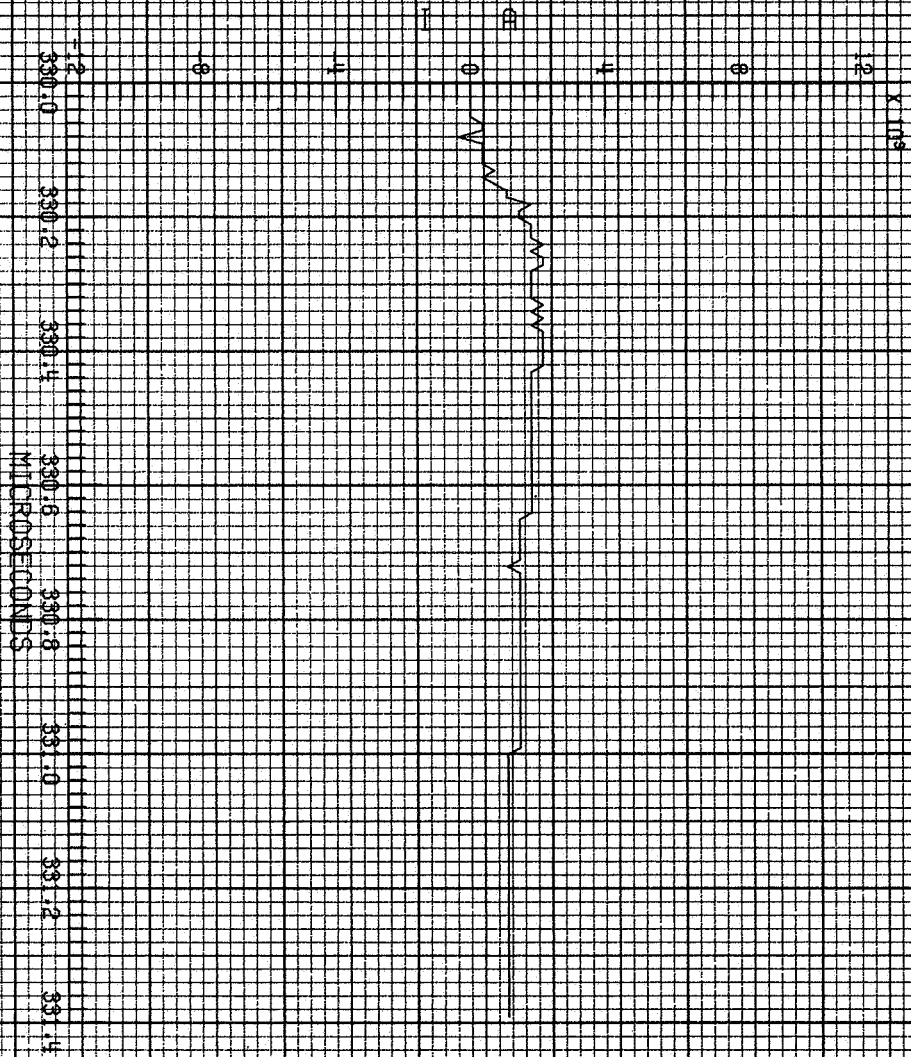


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F106 LIGHTNING/PCM/TK10/M. THOMAS

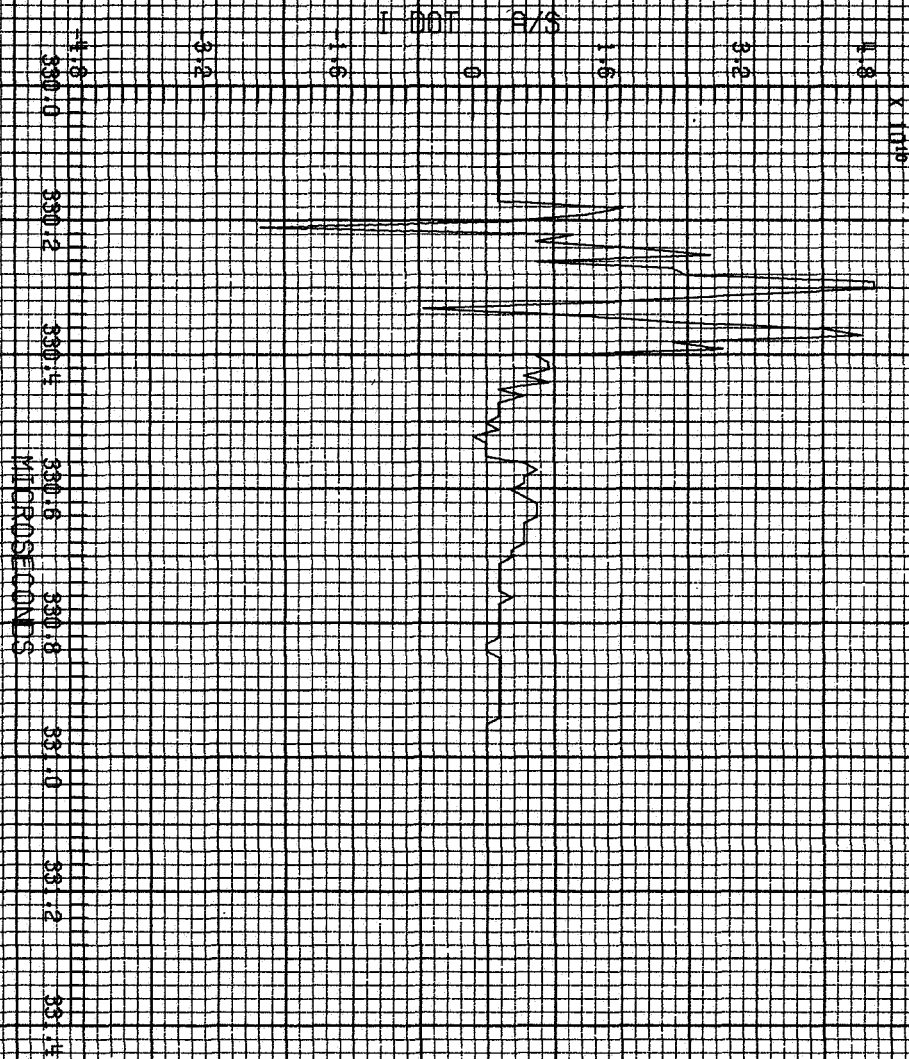
TEST NO. 82-044

RUN NO. 3



OF

RUN NO. 4

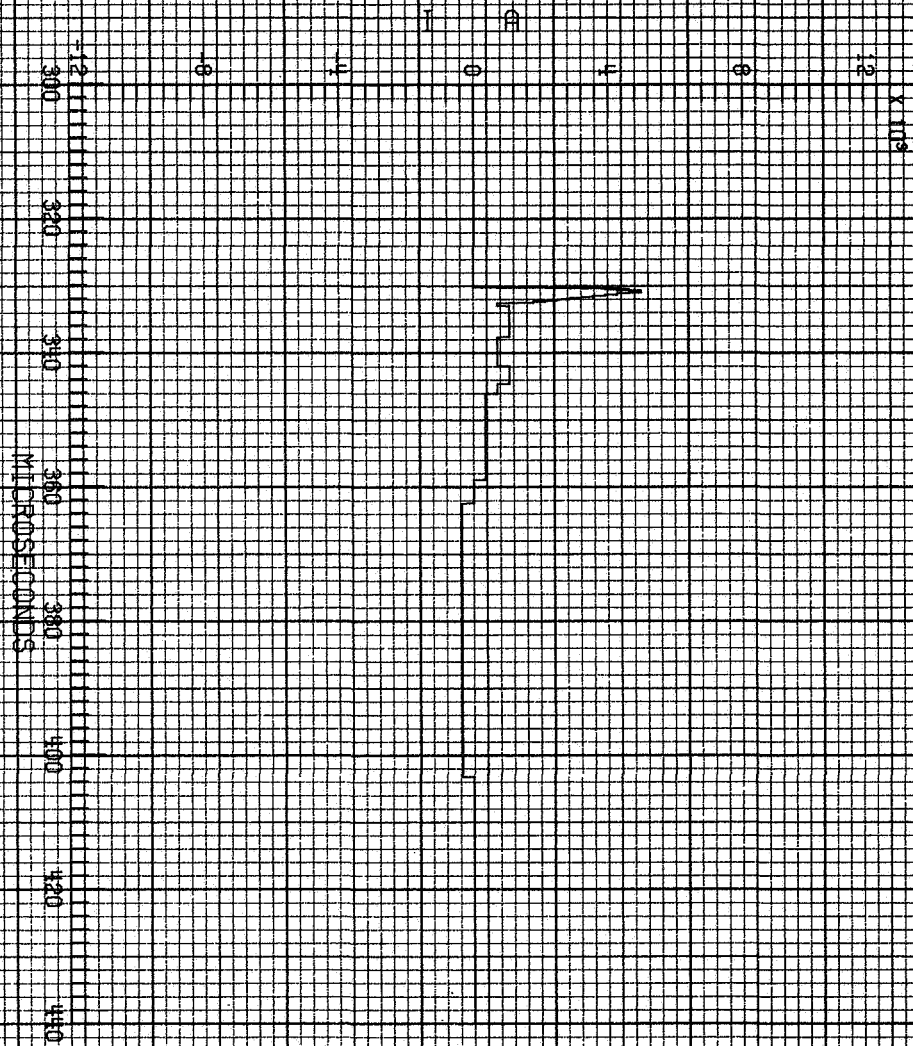


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E106 LIGHTNING/PCM/TK10/M. THOMAS

TEST NO. 82-044

RUN NO. 4

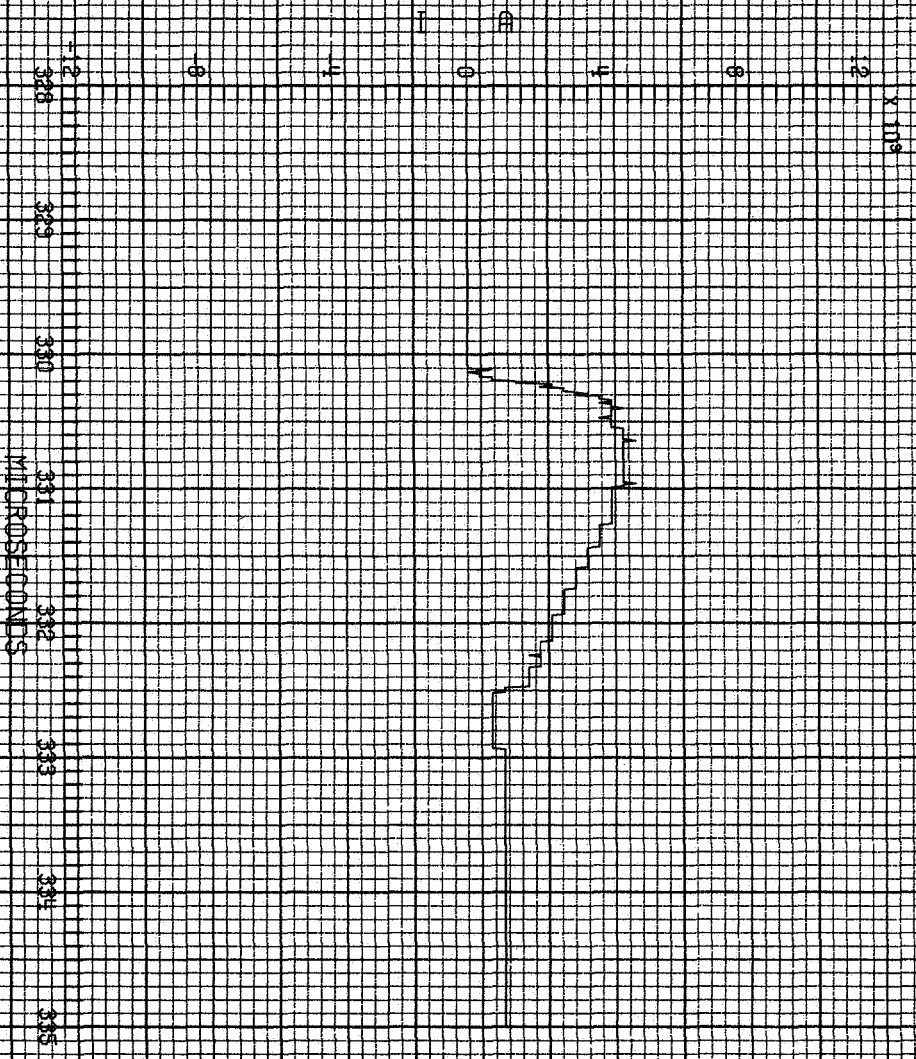


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F106 LIGHTNING/PCM/TK10/M. THOMAS

TEST NO. 82-044

RUN NO. 4

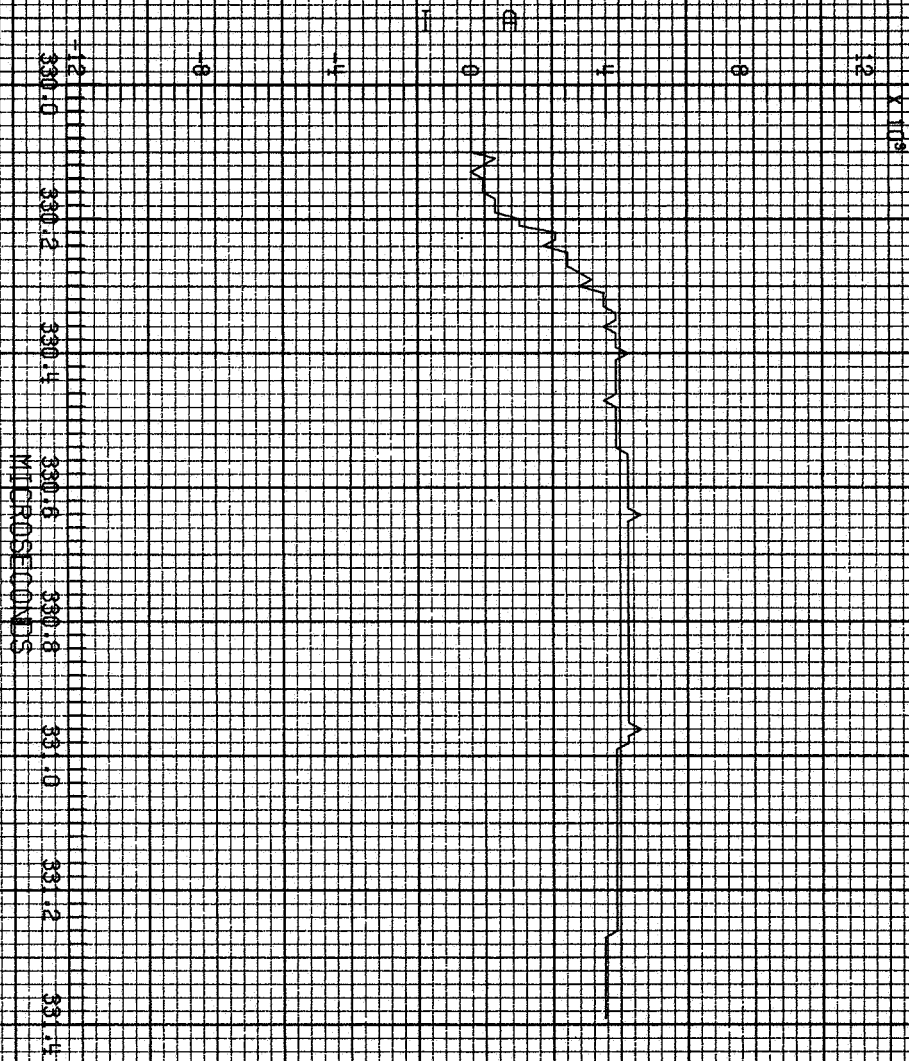


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TEST NO. 82-G44

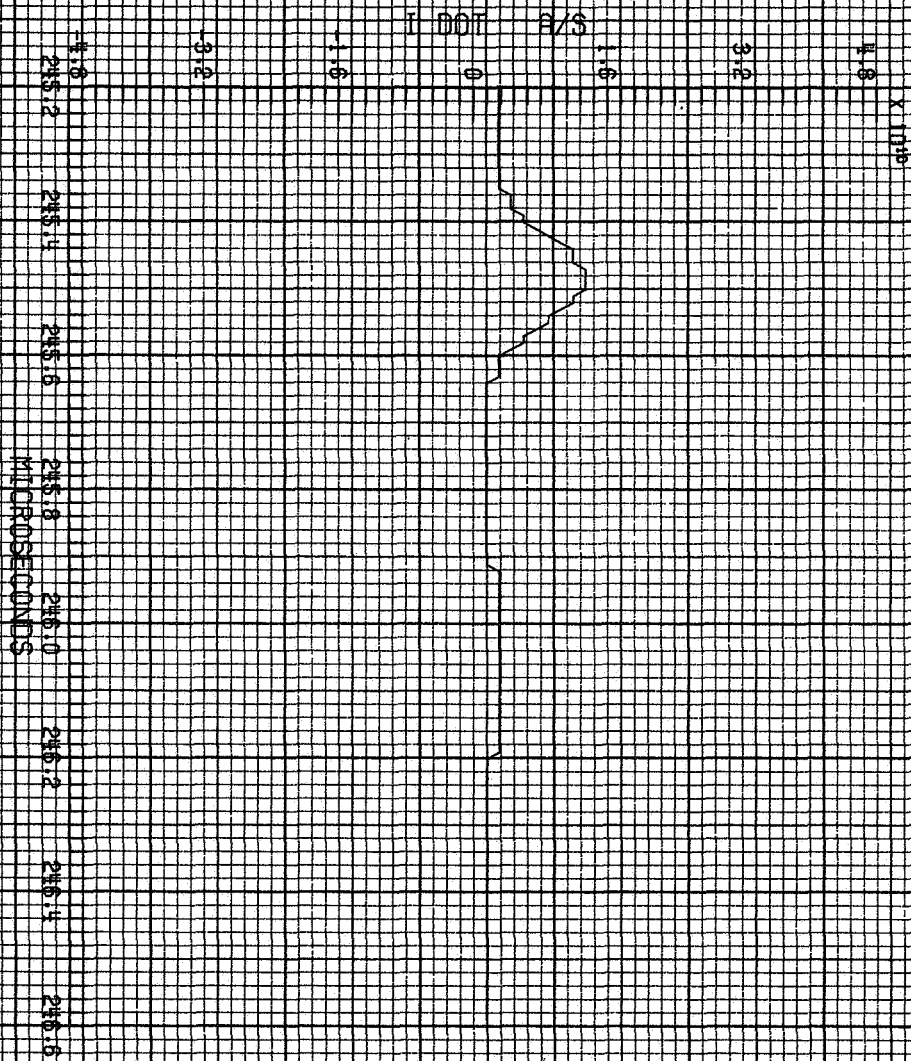
RUN NO. 4



F106 LIGHTNING/TK 8/M.THOMAS

TEST NO. 82-047

RUN NO. 1

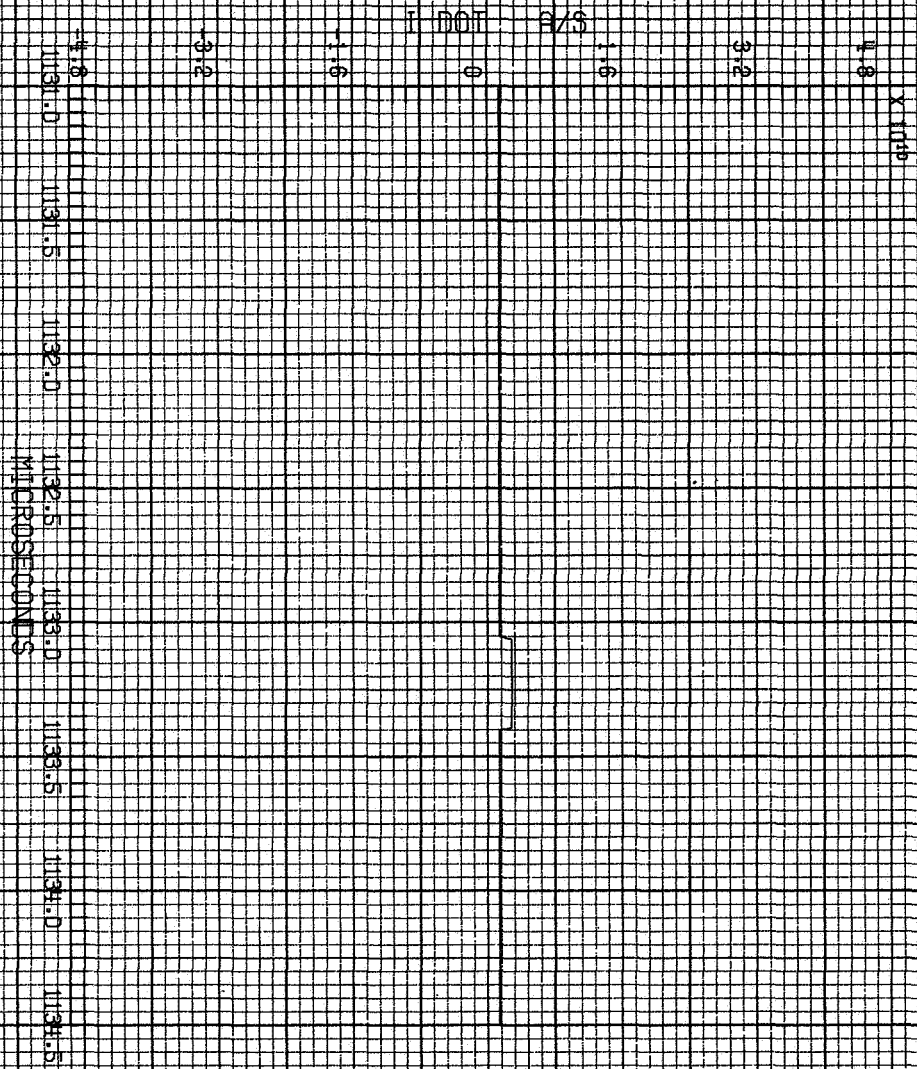


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F106 LIGHTNING/TK 8/M.THOMAS

TEST NO. 82-047

RUN NO. 1



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F106 LIGHTNING/TK 10/M. THOMAS

TEST NO. 82-047

RUN NO. 1

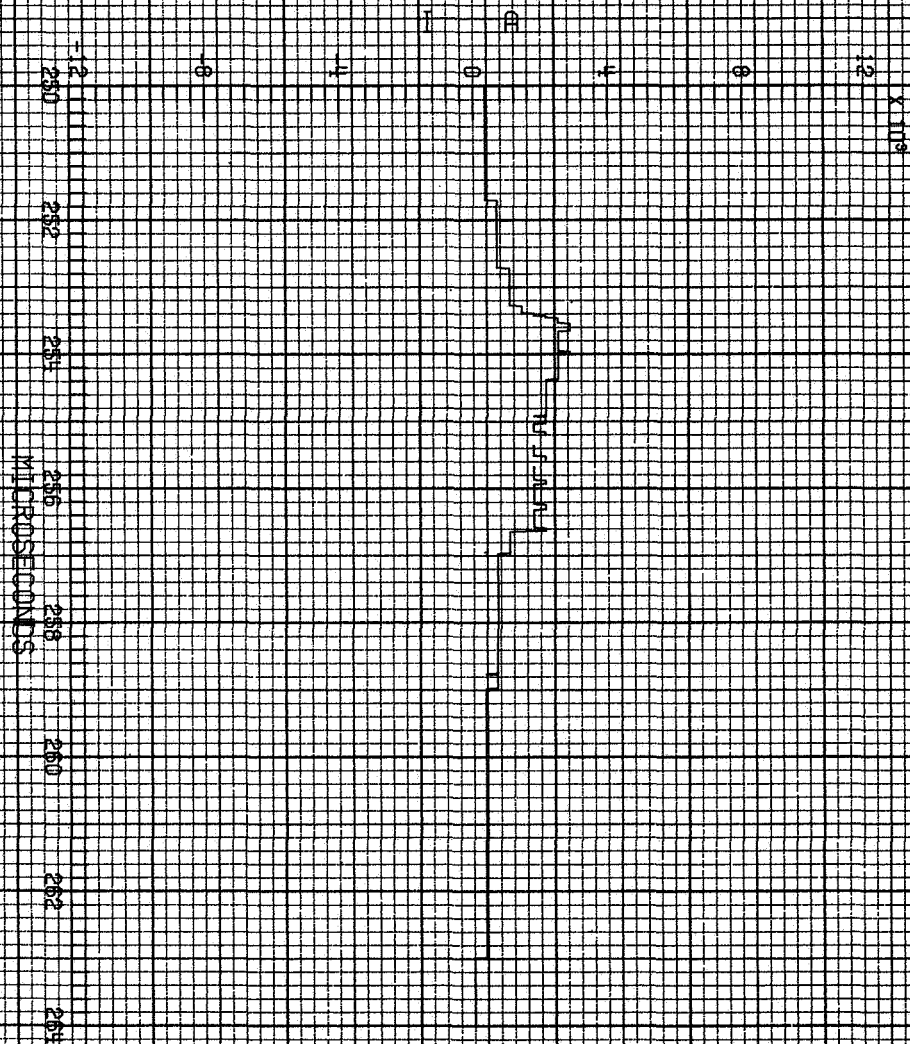


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F106 LIGHTNING/TK 10/M. THOMAS

TEST NO. 82-047

RUN NO. 1



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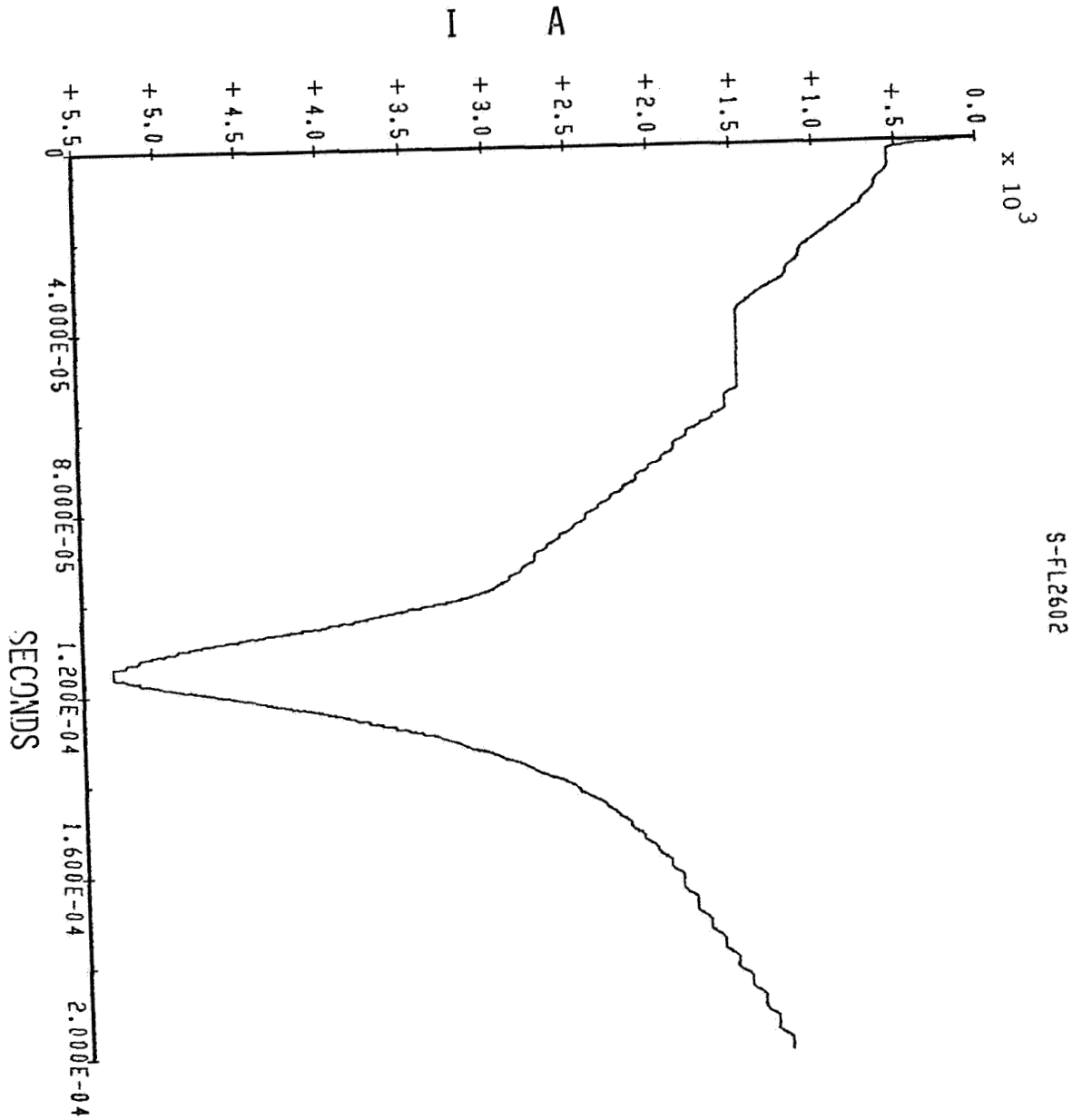
F106 LIGHTNING/TK 10/M. THOMAS

TEST NO. 82-047

RUN NO. 1

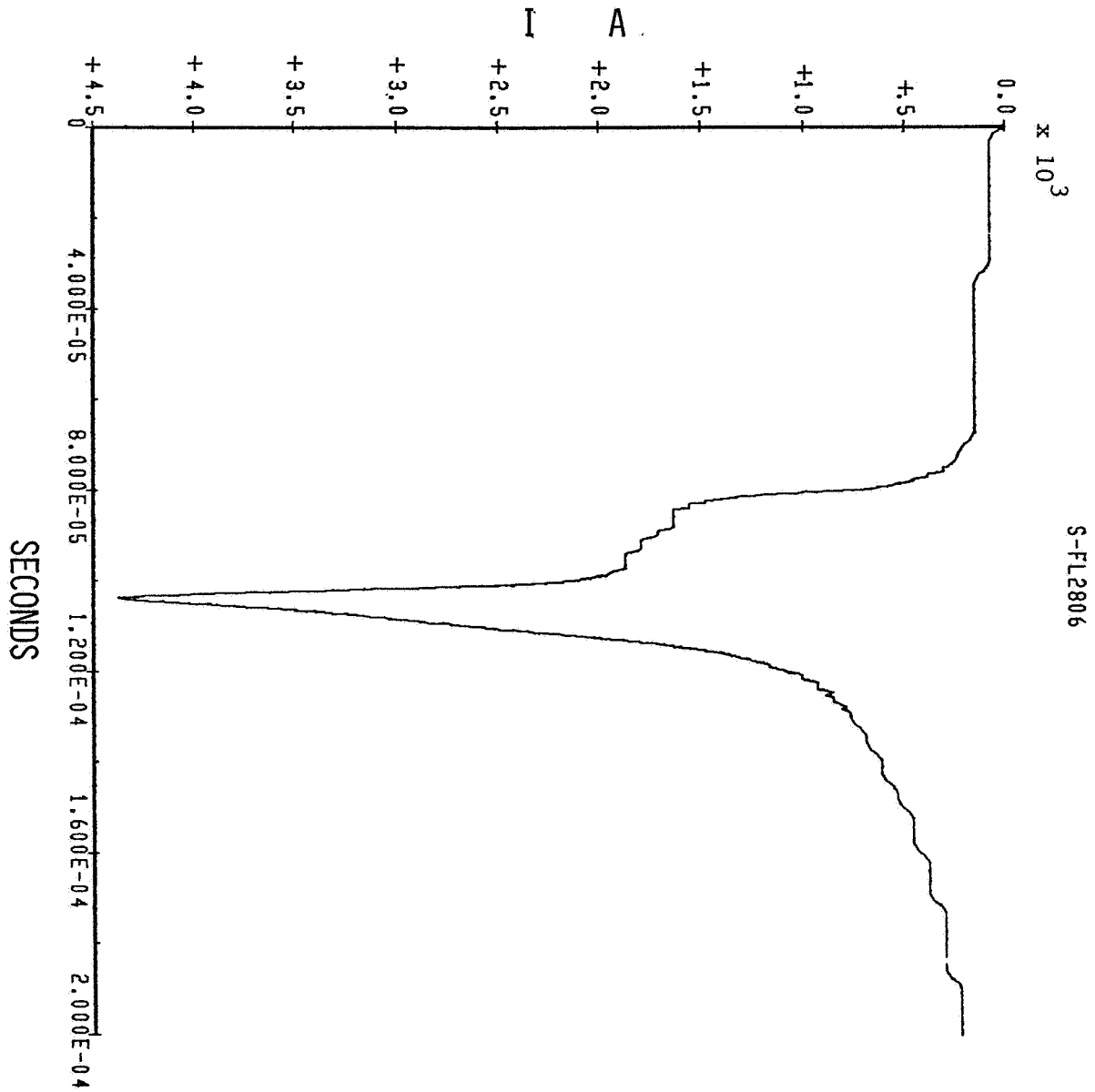


DATA LOGGER TEST NO. 82-026 RUN 2



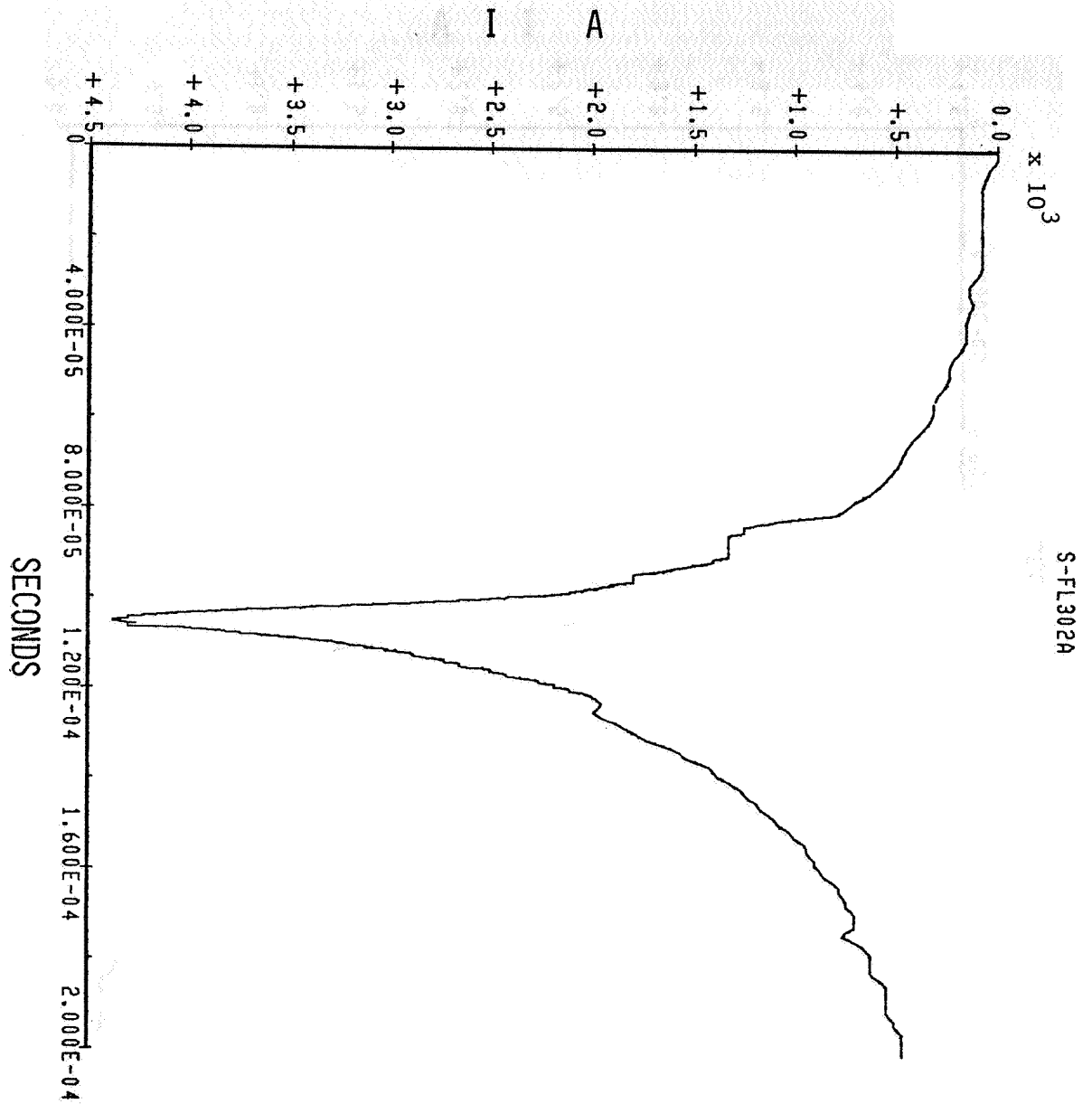
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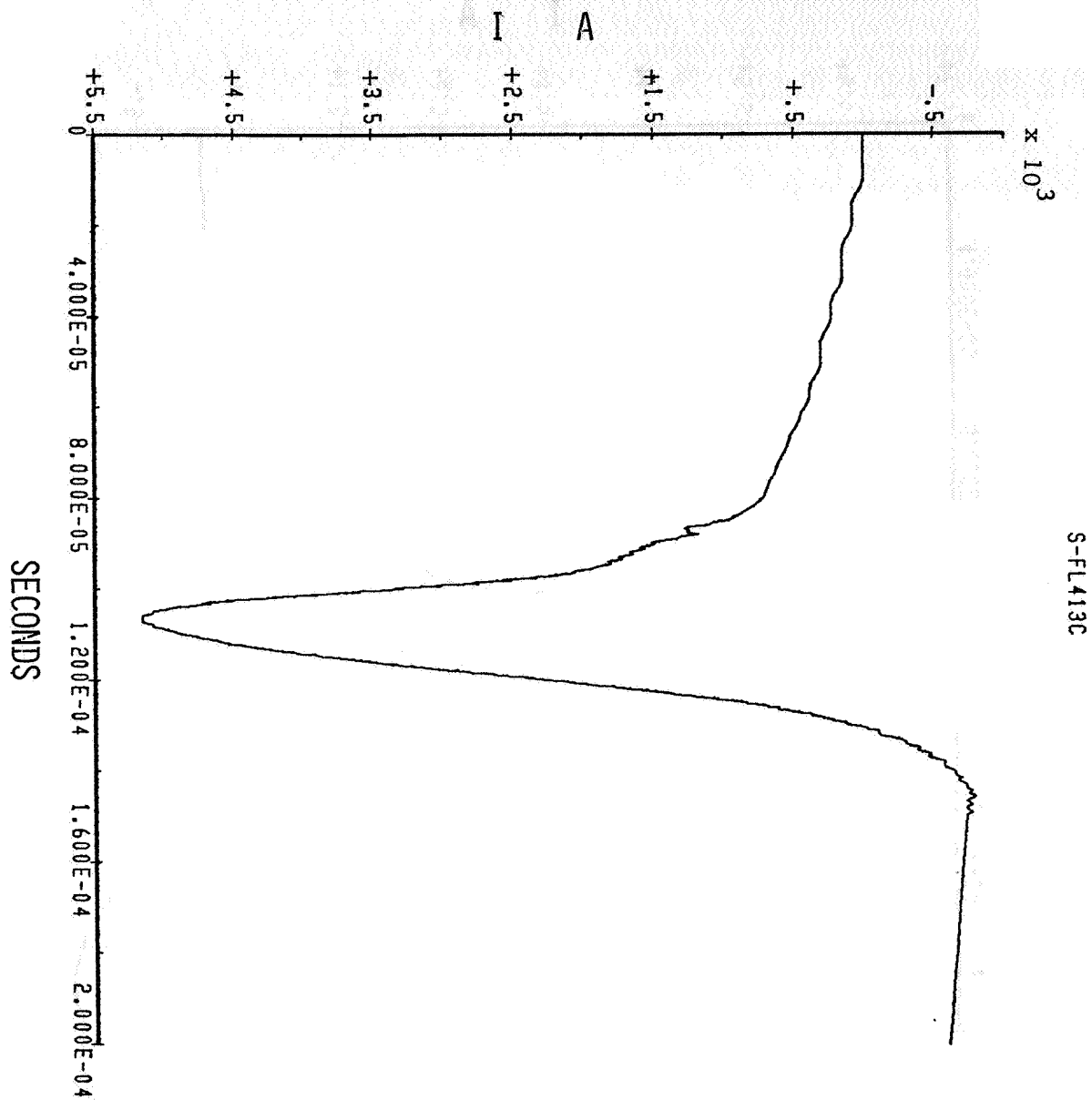


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DATA LOGGER TEST NO. 82-039 RUN 1



DATA LOGGER TEST NO. 82-041 RUN 6

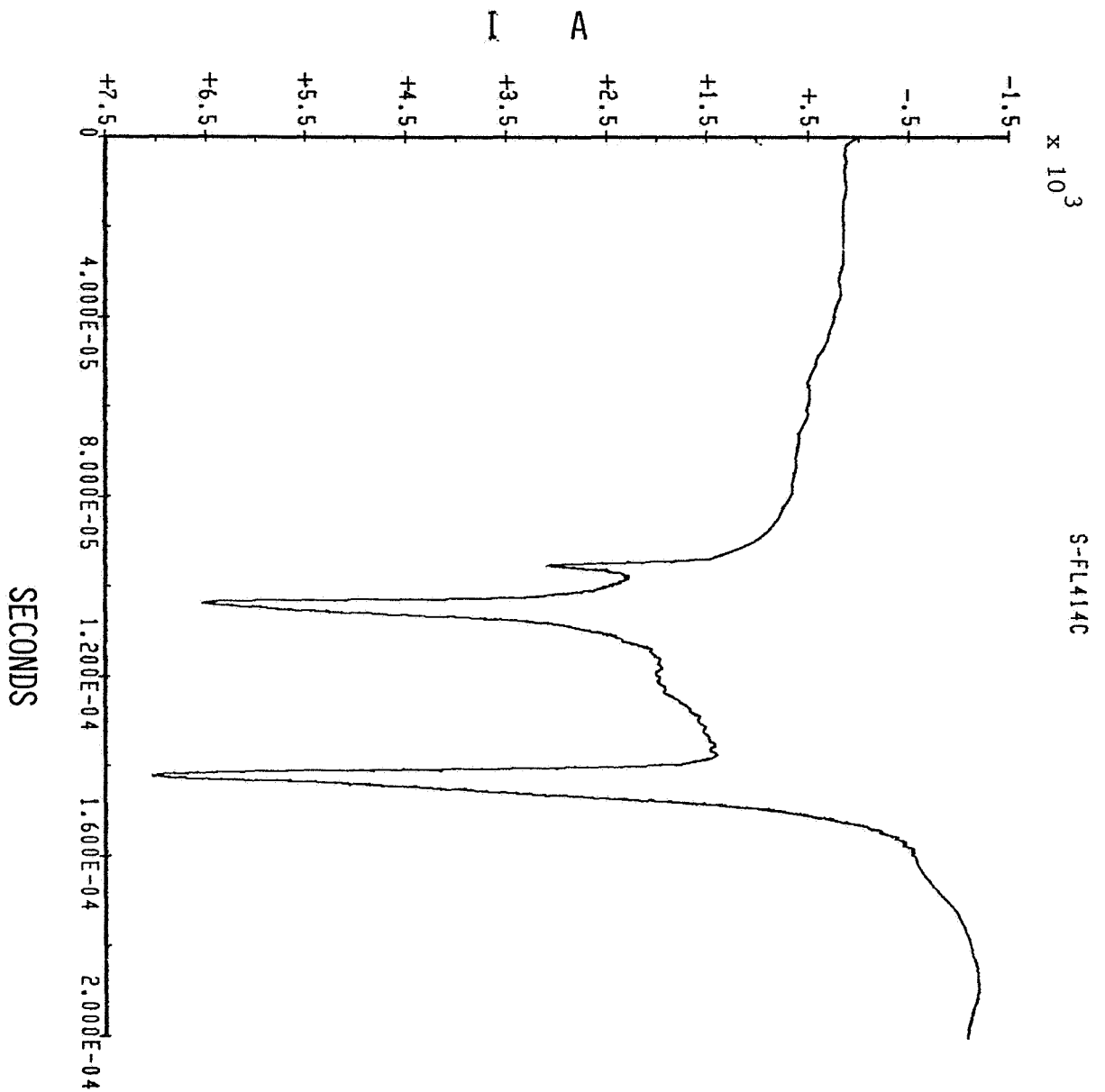


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DATA LOGGER

TEST NO. 82-041

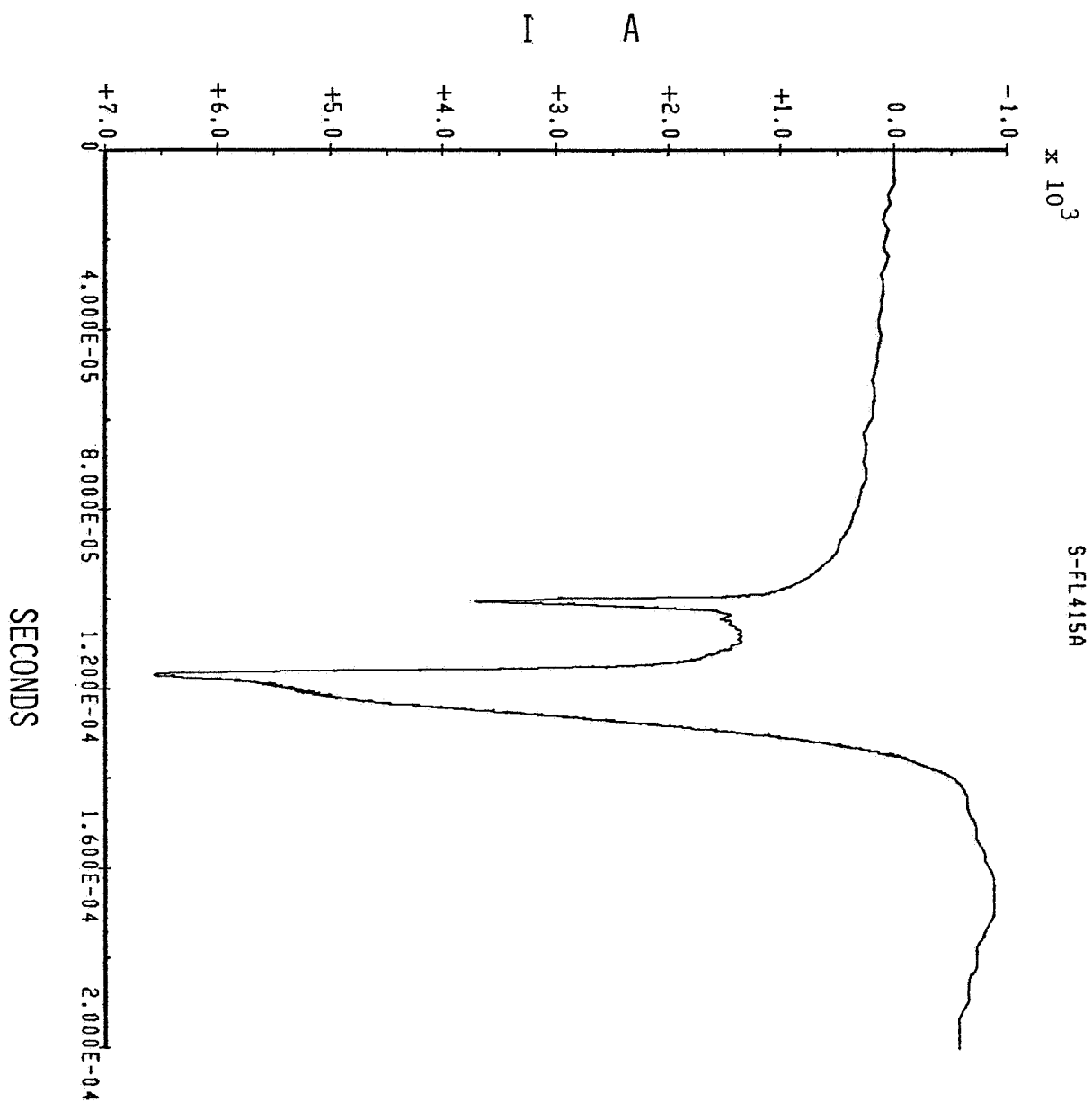
RUN 8



C-6

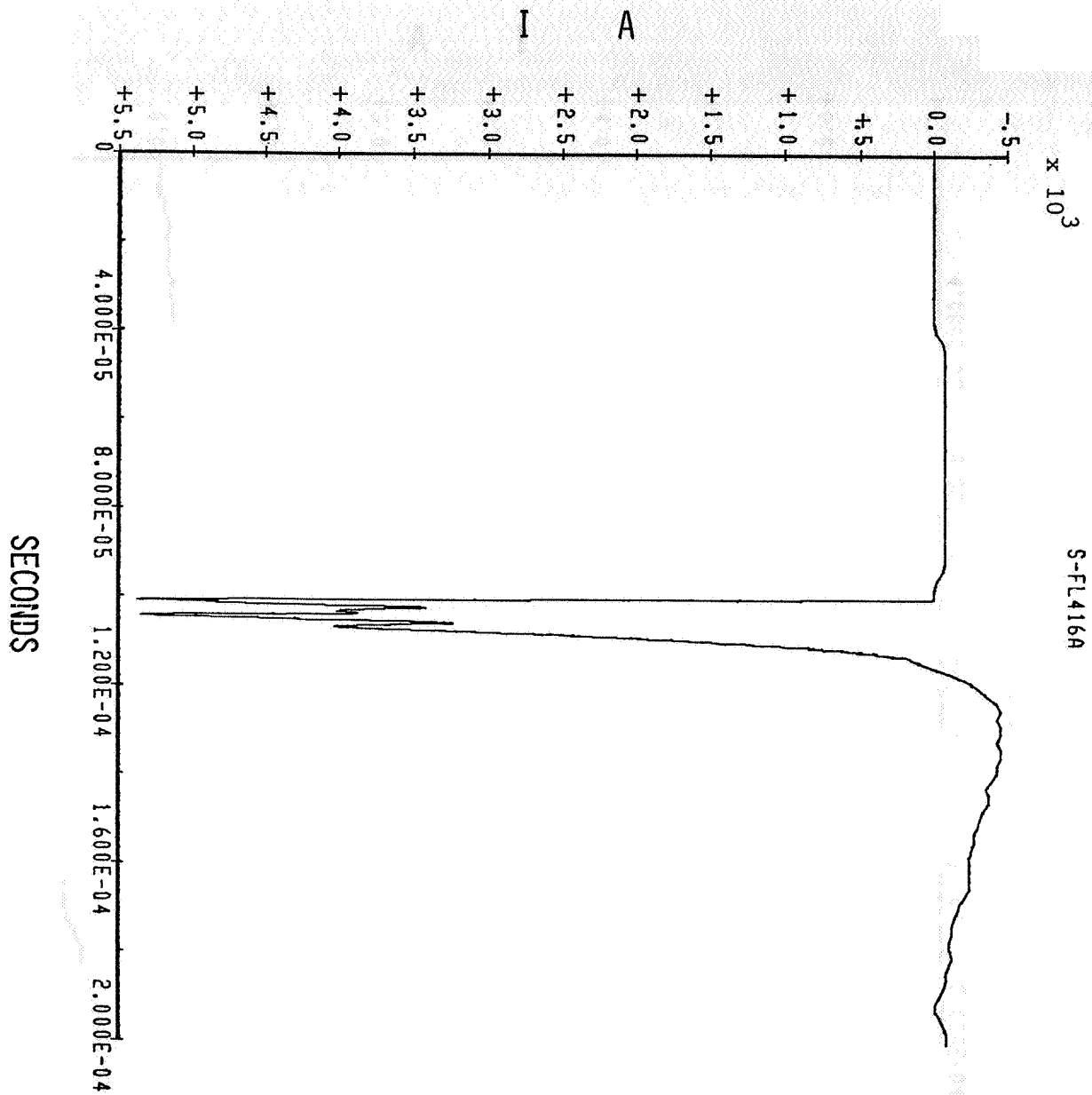
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DATA LOGGER TEST NO. 82-041 RUN 18



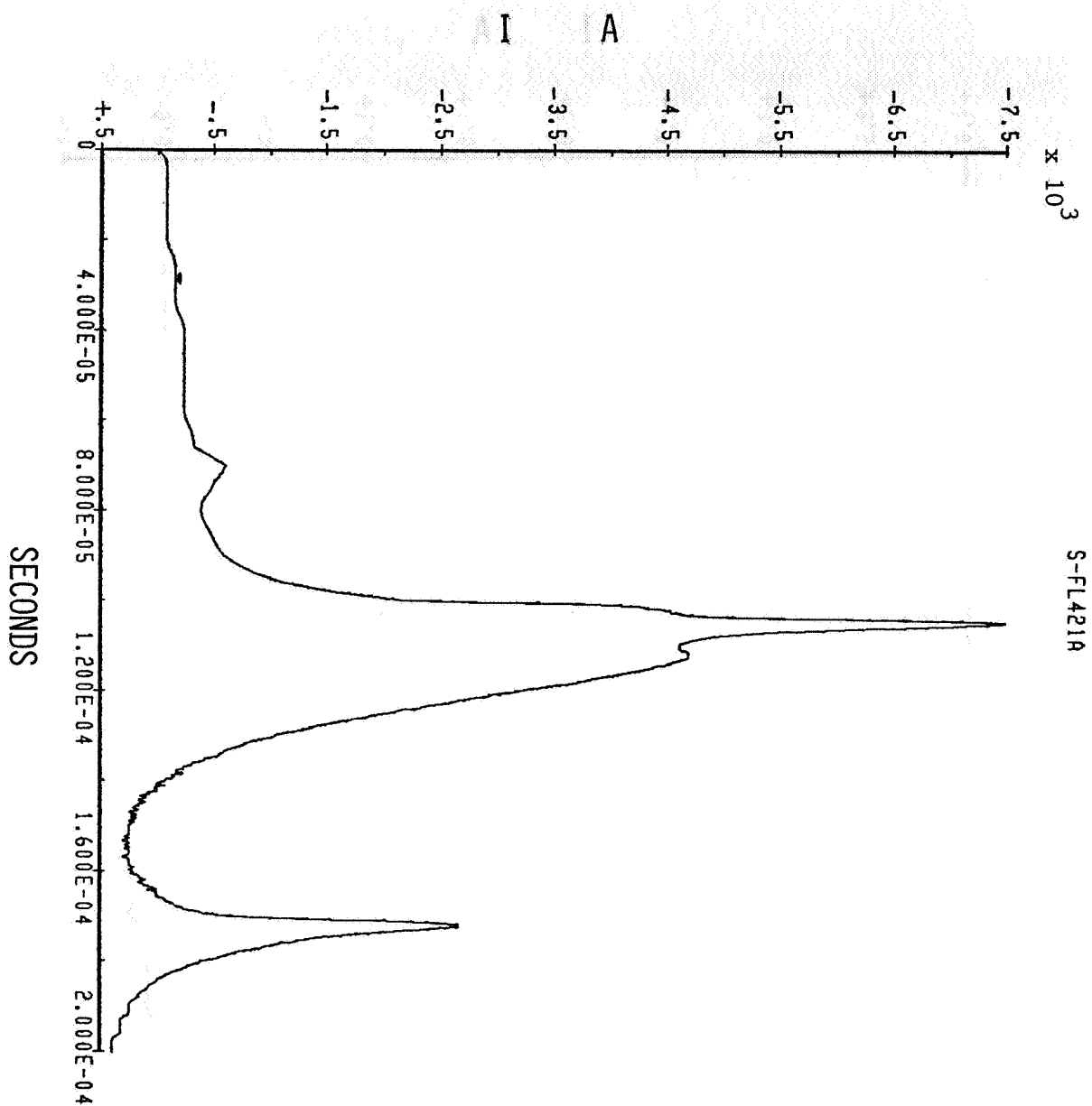
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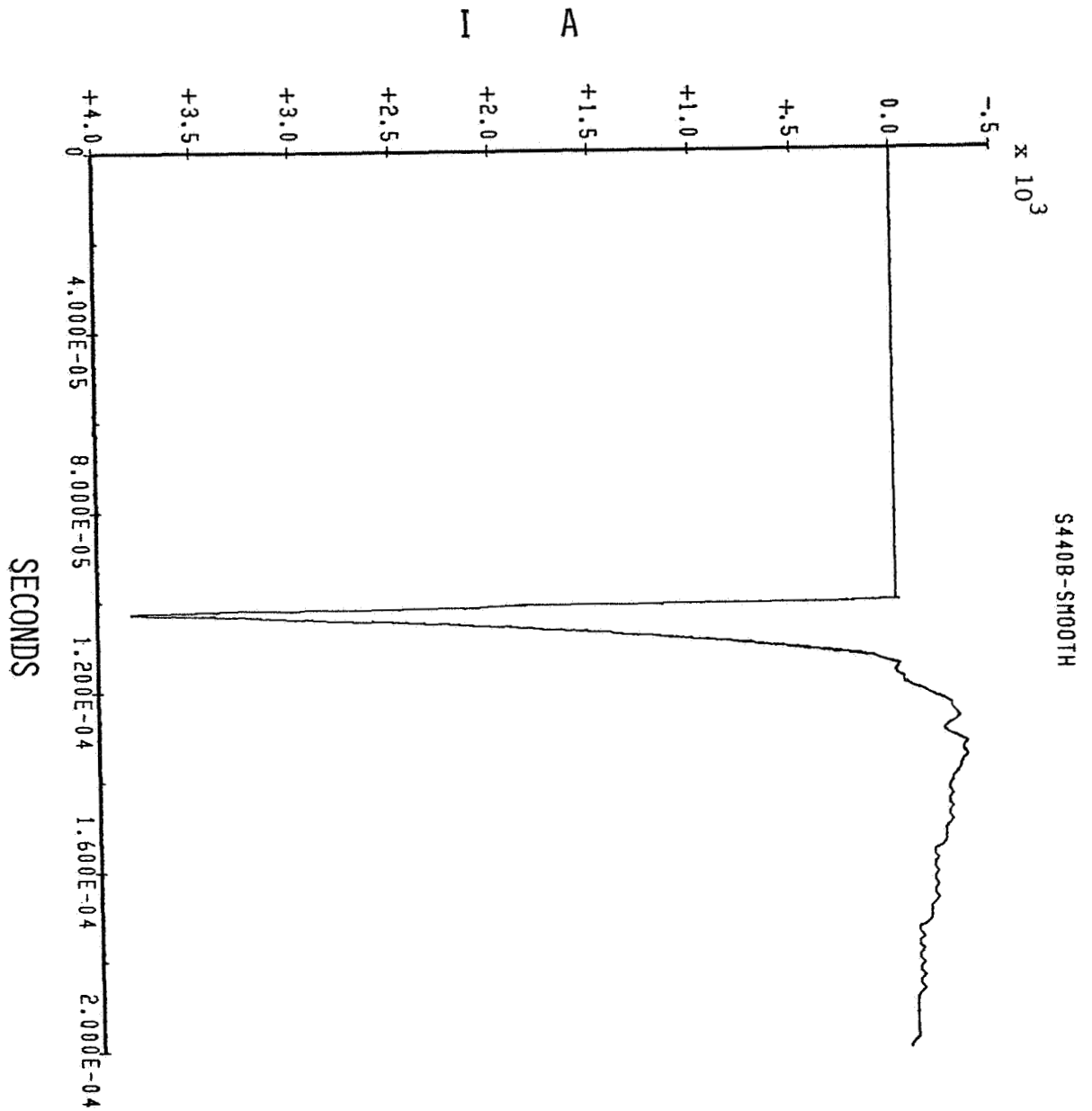


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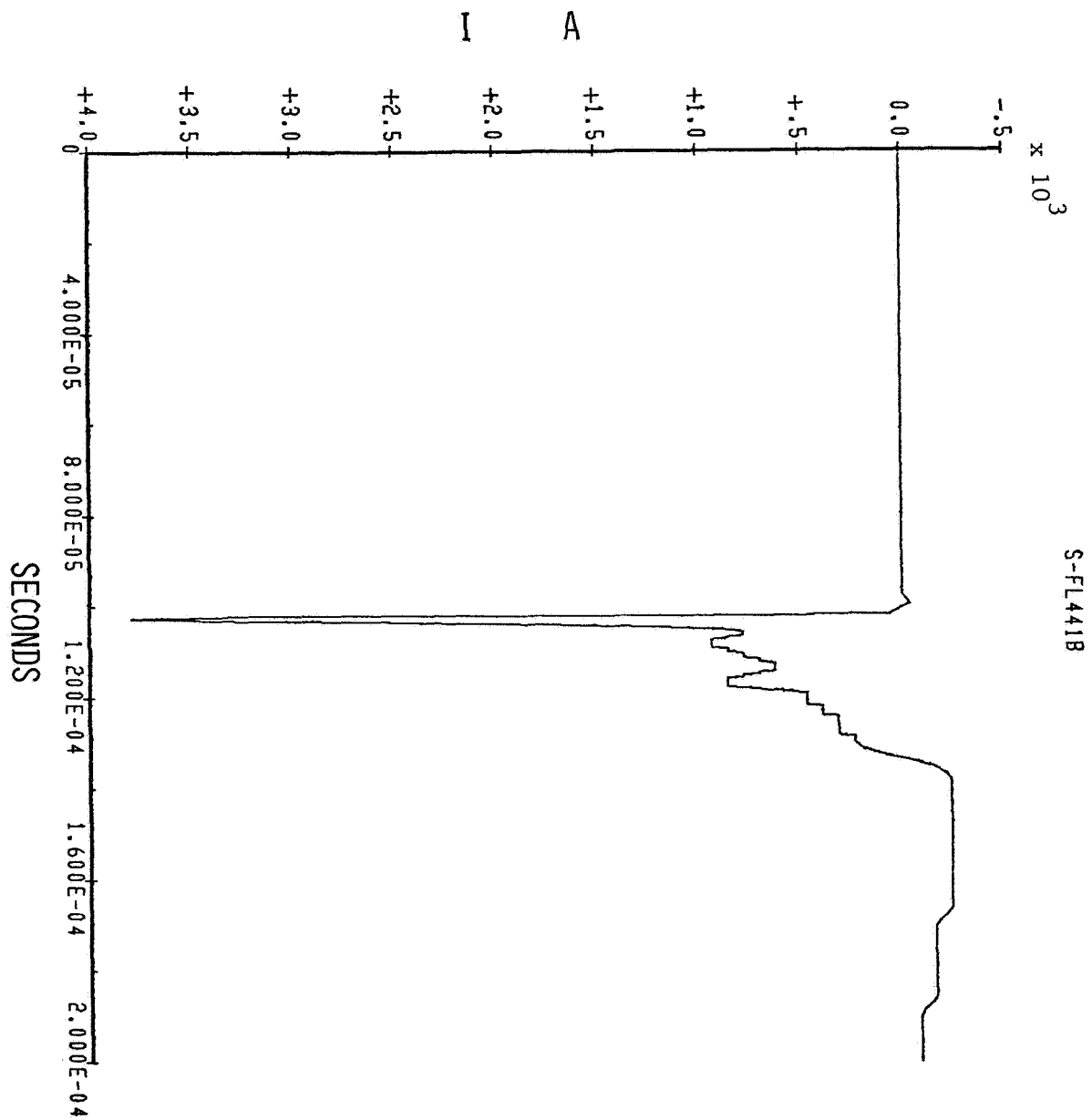
DATA LOGGER TEST NO. 82-042 RUN 5



DATA LOGGER TEST NO. 82-944 RUN 2



DATA LOGGER TEST NO. 82-044 RUN 4



1. Report No. NASA TM-84626		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle 1982 Direct Strike Lightning Data				5. Report Date March 1983	
				6. Performing Organization Code 505-45-03-02	
7. Author(s) Mitchel E. Thomas and Felix L. Pitts				8. Performing Organization Report No.	
9. Performing Organization Name and Address NASA Langley Research Center Hampton, VA 23665				10. Work Unit No.	
				11. Contract or Grant No.	
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, DC 20546				13. Type of Report and Period Covered Technical Memorandum	
				14. Sponsoring Agency Code	
15. Supplementary Notes					
16. Abstract Data waveforms are presented which were obtained during the 1982 direct-strike lightning tests utilizing the NASA F106-B aircraft specially instrumented for lightning electromagnetic measurements. The aircraft was operated in the vicinity of the NASA Langley Research Center, Hampton, Virginia, in a thunderstorm environment to elicit strikes. Electromagnetic field data were recorded for both attached lightning and free field excitation of the aircraft.					
17. Key Words (Suggested by Author(s)) Lightning Direct-strike lightning Electromagnetic measurement				18. Distribution Statement [REDACTED] [REDACTED]	
19. Security Classif. (of this report) UNCLASSIFIED		20. Security Classif. (of this page) UNCLASSIFIED		21. No. of Pages 490	
				22. Price	